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Patsy Ruth Miller

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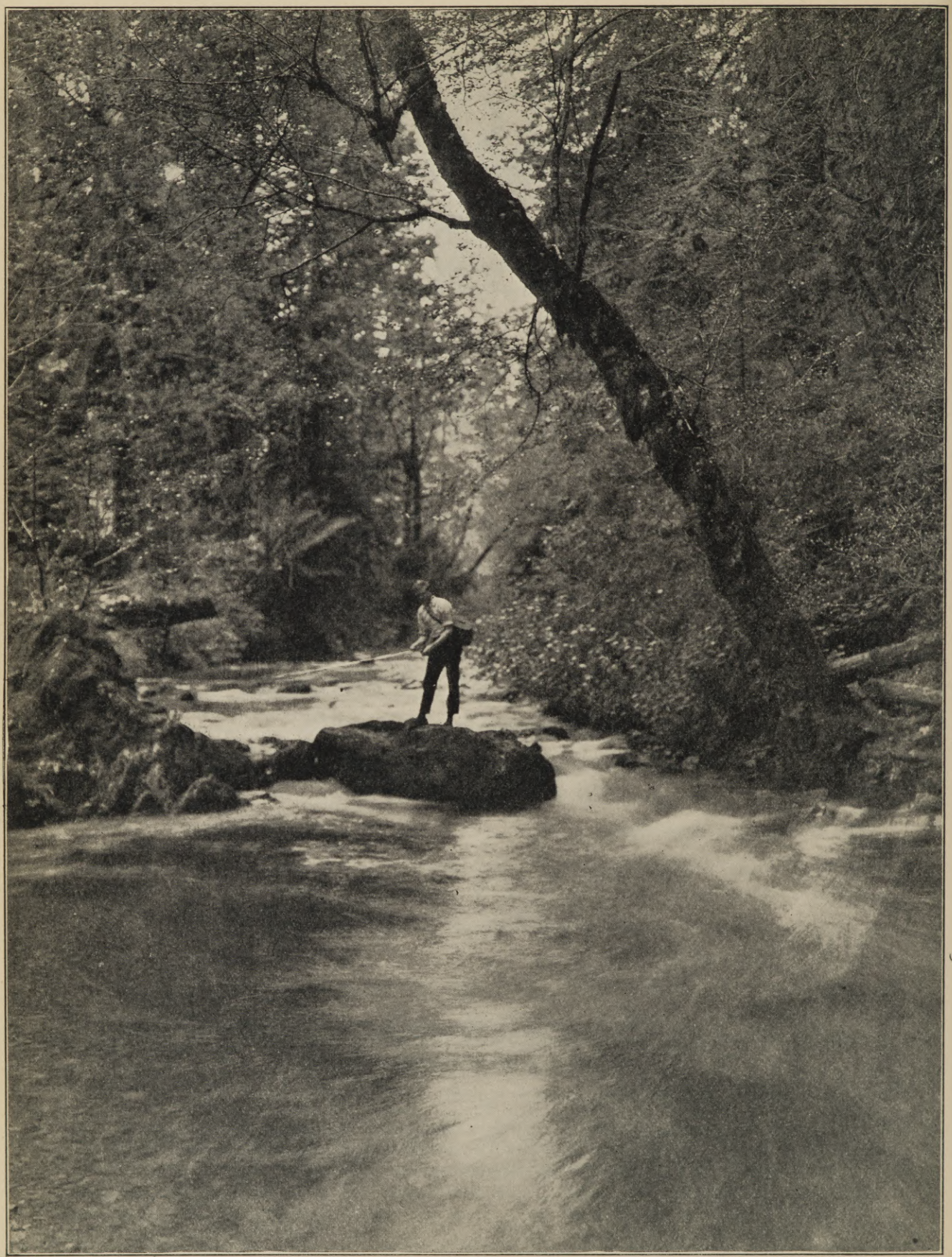


Goldstream, near Victoria, British Columbia

SOME PROPERTIES OF FIXING BATHS

Part One of an Unusually Interesting and Informative Paper Presented at Spring Meeting of S. M. P. E. at New York City, May 6-9, 1929

By J. I. CRABTREE *and* H. A. HARTT

[This paper, which is Communication No. 396 from the Kodak Research Laboratories, Rochester, N. Y., will be published in three parts. The second installment will appear in the October issue. —*Ed. Note.*]

OF THE various types of fixing baths available, the potassium alum-acetic acid-sulfite fixing bath is employed to the greatest extent in modern motion picture film laboratories. Fixing baths containing chrome alum and, to a lesser extent, formaldehyde are also employed, but a description of the properties of such baths will be reserved for a future communication.

So far as is known, A. Lainer[1] was the first to suggest the addition of alum and sodium sulfite to a solution of hypo for fixing purposes but such a bath sludged very readily on the addition of developer. The authors have not been able to establish who was the first to suggest the addition of a weak acid to such an alum-sulfite mixture.

Although acid-hardening fixing baths have been extensively employed during the past thirty years, very little has been known regarding the precise effect of varying the proportion of the constituent chemicals or of the effect of use on their properties. It is the purpose of this paper to present some of the results of extensive research on the subject during the past few years in the Research Laboratories of the Eastman Kodak Company.

I. *Requirements for a Satisfactory Fixing Bath*

A satisfactory fixing bath must fulfill the following requirements:

(*a*) It should dissolve the silver halide emulsion on the film with sufficient rapidity and continue to do so throughout its life, without staining the film.

(*b*) Even at summer temperatures, during its life the bath should not precipitate sulfur. If film is fixed in a bath which is precipitating sulfur, more or less colloidal sulfur will be precipitated in the gelatin film which cannot be removed by washing. The sulfur will then combine with the silver image, causing fading[2].

(*c*) During its useful life, the bath should not precipitate aluminum sulfite. This precipitate forms as a result of the reaction between the alum and the sulfite when the acid in the fixing bath becomes neutralized by the alkaline developer carried in by the film.

It has been shown by Sheppard and Ballard[3] that this precipitate consists of basic aluminum sulfite, the ratio of sulfurous acid to alumina varying according to the conditions of precipitation. Throughout this paper the precipitate will be termed "aluminum sulfite."

(*d*) The bath should not produce blisters in the gelatin coating of the film. If the bath is too acid, on the addition of developer the formation of carbon dioxide gas proceeds too rapidly and gas pockets are apt to form within the gelatin layer which finally break, causing blisters.

(*e*) The degree of hardening of the fixed-out gelatin film should be satisfactory. Hardening of the film, however, is not necessary, provided the gelatin coating of the film does not swell excessively during processing so that it can be handled and dried satisfactorily.

Hardening primarily retards the swelling of the gelatin coating so that the film can be dried faster. In the case of unswollen and hardened film there is a minimum of water present in the film to be evaporated, while a higher temperature of the drying air can be employed without danger of softening or melting the gelatin coating. In case the film is handled by the rack and tank system[4], the gelatin coating of unhardened film is apt to be damaged during wiping or squeegeeing previous to drying so that hardening is usually desirable.

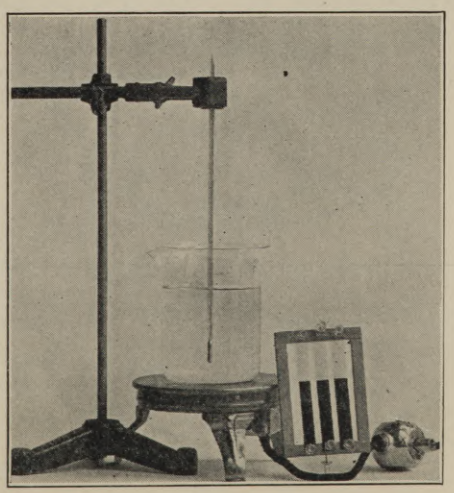


Fig. 1. *Apparatus for determining the melting point of the gelatin coating on motion picture film.*

The addition of developer to the fixing bath also has a decided effect on the hardening properties of the bath. Therefore, the bath should be so compounded as to maintain as nearly uniform hardening as possible throughout its life in spite of the gradual accumulation of developer carried over by the film.

(*f*) The cost of the bath in terms of the quantity of film fixed in it should be as low as possible.

II. *Classification of Fixing Baths*

Two essential types of fixing baths are in common use, namely (1) non-hardening fixing baths; (a) plain hypo, (b) acid hypo; and (2) acid-hardening fixing baths.

1. *Non-hardening Fixing Baths*

A plain solution of hypo is quite satisfactory for fixing purposes provided little or no developer is carried over to it by the films. It is therefore necessary either to wash the film thoroughly after developing and before fixing, which is usually impractical, or to use an acid stop or rinse bath. In such a case, some sodium sulfite must be added to the hypo to prevent sulfurization by the acid carried over by the films from the stop bath.

Many motion picture laboratories employ non-hardening fixing baths with their processing machines. A satisfactory formula is as follows:

	METRIC	AVOIRDUPOIS
Hypo	250 grams	100 lbs.
Sodium sulfite (desiccated)	10 grams	4 lbs.
Sodium bisulfite	25 grams	10 lbs.
Water to make	1 liter	50 gal.

The function of the bisulfite is to neutralize the sodium carbonate in the developer carried over by the films while the sodium sulfite serves to prevent possible sulfurization in hot weather. It is necessary to maintain the acidity of the bath either by allowing a continuous stream of sodium bisulfite solution to flow into the bath, or by adding a definite volume of a stock solution at intervals. The precise quantity to add depends on the alkalinity of the developer, the degree of rinsing between developing and fixing, and the quantity of film processed, but this can be determined easily by titrating a small quantity of the fixing bath with alkali at intervals to ascertain the loss in acidity.

An alternative method of maintaining the acidity is to pass sulfur dioxide gas into the fixing bath either continuously or intermittently through a perforated hard rubber tube leading to the bottom of the tank. There is little to choose between sulfur dioxide gas or a sodium bisulfite solution as regards efficiency but there is a danger of contaminating the darkroom atmosphere with the objectionable sulfur dioxide gas if an excess of gas is accidentally passed into the solution.

2. *Acid Hardening Fixing Baths*

An acid hardening fixing bath contains the following ingredients: (a) a silver halide solvent, (b) an anti-staining agent, (c) a preservative or sulfurization inhibi-

tor, (d) a hardening agent.

(*a*) Although many solvents of silver halides are available, the most satisfactory for fixing purposes are sodium and ammonium thiosulfate. A solution of ammonium thiosulfate of a given concentration fixes more rapidly than a corresponding solution of sodium thiosulfate[5] but ammonium thiosulfate is more expensive and commercial grades are apt to contain free sulfur. For most purposes sodium thiosulfate fixes sufficiently rapidly and is entirely satisfactory.

(*b*) Practically any acid will function as an anti-staining agent because it has merely to neutralize the alkali in the developer carried over by the films and thereby retard oxidation of the developing agent. Organic acids such as citric, tartaric, oxalic, lactic, malic, maleic, and acetic, are more suitable than the inorganic acids because they are less dissociated and therefore have a correspondingly less tendency to precipitate sulfur from the hypo. Practically all of the sole organic acids yield with aluminium salts complex aluminium ions which are not effective hardening agents.[8] Acetic acid has been found to be the most generally efficient acid for use in fixing baths but much is still to be desired from the standpoint of a perfect acid for this purpose.

Of the acid salts, sodium bisulfite and potassium metabisulfite are the most generally used but they are not suitable for compounding a hardening fixture bath containing alum because the reserve acidity of these salts is not sufficient to prevent the precipitation of aluminium sulfite on the addition of alkali.

(*c*) It is imperative when compounding an acid fixing bath to have a quantity of free acid present in order to prevent discoloration of the bath by developer oxidation products and also to prevent the precipitation of the hardening agents by the alkali in the developer. This free acid tends to cause the precipitation of sulfur from the hypo especially at temperatures above 70° F. It is therefore necessary to add some substance which will prevent the precipitation of sulfur without impairing the anti-staining properties of the acid.

Two types of substances act in this manner. The first of these consists of the alkaline sulfites of which sodium sulfite is the most common. Since hypo decomposes in the presence of acid to form sodium sulfite and sulfur, it is considered that the addition of sulfite to an acid fixing bath retards the decomposition of the hypo because it tends to reverse the action by virtue of its mass action.

The second type of preservative consists of the alkali salts of organic acids which are commonly referred to as "buffer salts" and of which sodium acetate is a typical example. The effect of this type of substance is to buffer or reduce the hydrogen ion concentration of the acid employed below the limit at which sulfur is precipitated from hypo by acids.

(*d*) The hardening of gelatin may either be temporary or permanent. Temporary hardening agents raise the melting point and prevent the swelling of gelatin only while the gelatin is in contact with the hardening solution. A concentrated solution of sodium sulfate is a typical temporary hardener.[7] The hardening produced by such substances is reversible, that is, the gelatin will subsequently absorb water and swell. Such hardeners will not be discussed because their application is limited to tropical development when the temperature of the various photographic solutions is above 75° F.

Permanent hardening is characterized by a reduced absorption of water (swelling) by the gelatin during subsequent washing. Various materials may be used for permanently hardening gelatin such as formalin, quinone, tannin, organic developer oxidation products, and certain inorganic compounds. Formalin, quinone, and developer oxidation products harden gelatin only in alkaline or neutral solutions and their application is therefore limited to use in developers or to the hardening of completely washed film.

Of the inorganic compounds, the salts of iron, chromium and aluminium exert the most powerful hardening action on gelatin. Salts of aluminium are perhaps the most satisfactory hardener because they are colorless, readily soluble in water, and do not form colored compounds with the common developing agents either in acid or alkaline solutions, while they give satisfactory hardening provided the wash water is not above 75° to 80° F. Aluminium chloride tends to hydrolyze when dissolved in water, forming a white precipiate of aluminium hydroxide, but the double salts of aluminium sulfate with sodium or potassium sulfate called *alums* form a clear solution and are therefore to be preferred. Sodium and potassium alum are equally efficient but with ammonium alum an evolution of ammonia takes place after the fixing bath becomes alkaline and this tends to produce dichroic fog.[2]

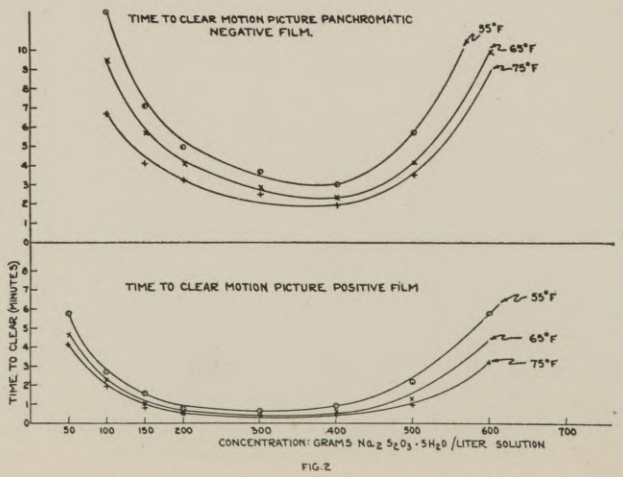


FIG. 2

Curves showing the time to clear Eastman motion picture positive and negative film in hypo solutions of various concentrations at different temperatures.

III. *Standard Tests for Determining the Properties of Fixing Baths*

To date very few methods of representing the properties of a fixing bath in numerical terms have been published. The following tests, however, in no way give absolute measurements but they have proved satisfactory as a means of comparing the various formulas examined.

1. *Time of Fixation*

The time to clear Eastman negative motion picture panchromatic film when viewed against a black background was taken as a measure of the time of fixation. In order to maintain uniformity the film was immersed directly in the fixing bath and not previously developed in order to eliminate any error caused by swelling, which might influence the rate of diffusion of the hypo into the gelatin film and thereby affect the rate of fixation.

2. *Acidity*

One hundred cubic centimeter portions of the fixing bath were titrated with MQ_{25}* developer using phenolphthalein as an indicator. The results are expressed as the number of cubic centimeters of developer required to neutralize 100 c.c. of fixing bath.

3. *Sulfurization Life*

The time required for the average acid fixing bath to precipiate sulfur at ordinary temperatures (65° to 70° F.) is relatively long, so that in order to increase the rate of precipitation of sulfur and reduce the time required for the experiments, samples of the fixing bath were kept in glass-stoppered bottles at 110° to 115° F. and the time noted for the first visible turbidity. It was considered that a bath which was not stable under these conditions for one-half day was highly undesirable, whereas if the bath remained clear for three days at 110° to 115° F. it was found to remain clear for about one month at normal temperatures and therefore would be quite satisfactory for use at ordinary temperatures.

*Note—(Formula of MQ_{25} Developer)

Elon	1.25 *grams*
Hydroquinone	3.75 *grams*
Sodium sulfite	75.00 *grams*
Sodium carbonate	25.00 *grams*
Potassium bromide	1.5 *grams*
Water to	1.0 *liter*

4. *Hardening*

The relative hardening produced by a given fixing bath was determined as the temperature at which the emulsion left the support after treatment in the following standard manner:

Strips of Eastman motion picture positive film ⅜ inch by 5 inches were exposed so as to produce three densities at one end of the strip, ranging from approximately 0.5 to 2.5 after development. These strips were developed in MQ_{25} diluted 1:1 for 2 minutes, rinsed 30 seconds, fixed 5 minutes in the fixing bath to be tested, and washed 15 minutes in running water. The temperature of the solutions up to this point was maintained between the limits of 65° to 70° F. The film was then placed on a wooden frame which was immersed in a beaker containing 750 c.c. of water at 70° F. The temperature of the water in the beaker was raised from 8° to 10° F. per minute and the temperature at which the gelatin emulsion left the support was taken as the melting point or a relative measure of the hardening produced by the fixing bath. The apparatus as used is illustrated in Fig. 1. The temperature at which the gelatin emulsion reticulated was not recorded after the first few experiments because it was found that this value is related to the melting point by a definite ratio. The degree of hardening produced depends on a large number of factors all of which must be maintained constant if consistent results are to be obtained. Some of these factors may be tabulated as follows:

1. *Nature of emulsion used.*
2. *Alkalinity of the developer and time of development.*
3. *Composition of rinse or stop bath.*
4. *Time in rinse or stop bath.*
5. *Concentration and relative composition of fixing bath.*

(*Continued on Page 19*)

BORAX DEVELOPER CHARACTERISTICS

A Special Paper Prepared at the Laboratories of the Dupont-Pathe Film Manufacturing Corporation And Presented At Spring Meeting of S. M. P. E.

By H. W. MOYSE AND D. R. WHITE

THIS study of borax developers was undertaken because their wide use emphasized the importance of detailed knowledge of their action. The results of the study not only permit the selection of a developer formula which seems very satisfactory, but also points out the sort of variations that will either increase or decrease the activity of the developer, to meet any special needs that may occur.

The tests were made with a number of negative materials in each development. Strips of film were exposed back of a sector wheel which gave a series of exposures varying on a time scale with factor two steps between successive areas of the strip. Strips were then developed for a number of lengths of time in the developer being tested. During this development the flat developing tray used was rocked systematically to give high, reproducible agitation which rapidly removed development products from the emulsion surfaces of the strips which were held flat at the bottom of the tray. The densities were read as diffuse densities and gave the density-time of exposure-time of development data used in comparing the developers.

To cover systematically the range of possible combinations of chemicals two series of tests were conducted. In each series one basic formula was being considered, and the test centered to some extent on that formula but in both series the variations covered a relatively wide range of concentrations. Many of these, of course, were such that they could hardly be of commercial value, but they all aided in showing the relationships among and the developing effects of the constituents. Table 1 gives the two basic formulas and also indicates the range of concentrations tested.

Table 1

Chemical	Series 1	Series 2	Range
Sodium Sulfite (Anhyd.)	100 g.	75 g.	1-200 g.
Borax	2	5	0-Saturation
Metol	2	2.5	0-10
Hydroquinone	5	0	0-20
Potassium Bromide	0	0	0-2.5
Water to	1 liter	1 liter	

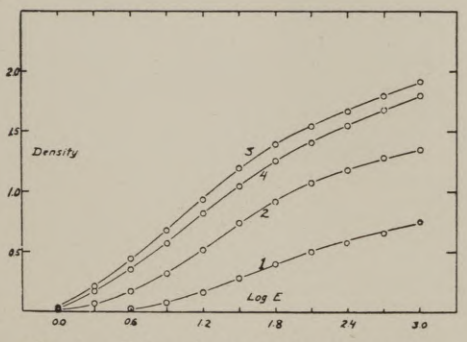


Fig. 1. Eight minute developments with: Sodium sulfite, varied; metol, 2 g /1. Hydroquinone, 5 g /1; borax 2 g /1. Emul. No. 1612.

Curve	Sulfite	Fog
1	1 (approx.)	.01
2	10	.06
3	50	.13
4	100	.14

Results

Sulfite

It was found that an increased rate of development accompanied increases in sulfite content up to a rather definite maximum, beyond which additional sulfite caused a falling off in high densities and in many cases a distinct loss in effective emulsion speed. Fig. 1 shows curves for one time of development in developers differing only in sulfite content.

The increasing development occasioned by increase of sulfite concentration from the initial low value is apparently due to the increased alkalinity produced by the larger quantities of sulfite. The alkalinity increases to a limiting value such that further sulfite additions leave it unchanged.

An increasing solvent action also accompanies increase of sulfite concentration. This solvent action has been known for many years and C. E. K. Mees and C. W. Piper (I) published data on the quantities of silver bromide necessary to saturate aqueous solution of sodium sulfite. Under developing conditions saturation may not be reached and the rapidity of solution may be affected by the other chemicals present. To test this solvent action in developers, test series were mixed differing only in sulfite content. Equal quantities of film were developed for equal times determined. Fig. 2 shows the change of silver content with increase of sulfite concentration. The slope of this curve is increasing rapidly, showing that a markedly greater effect of the solvent action is to be expected at the higher sulfite concentrations. The actual amount of silver observed in the developer was only a small proportion of the silver on the film, so small in fact that we hope to test more fully this solvent action to see if it really is a sufficient cause for the decrease of density observed.

The two effects just cited appear to be sufficient to account for the maximum development produced with increasing sulfite concentration. At low concentrations the increased alkalinity appears to be predominant while at high concentrations the solvent action seems more important. (*Continued on Page 23*)

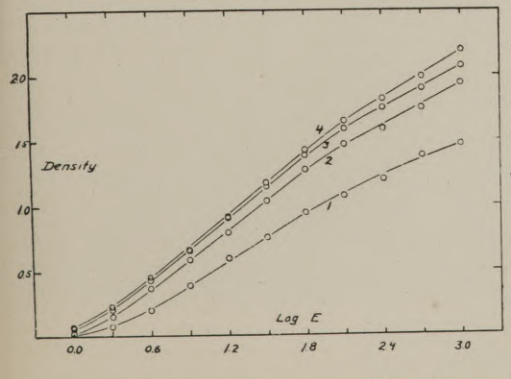


Fig. 3. Eight minute developments with: Sodium sulfite, 75 g /1; metol, 2.5 g /1; borax, varied. Emul. 2568.

Curve	Borax	pH	Fog
1	0	8.7	.03
2	2.5	8.7	.07
3	5	9.0	.07
4	10	9.1	.06

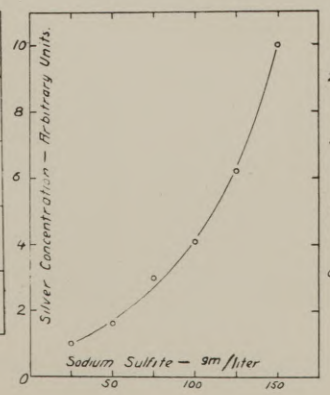


Fig. 2. Relative silver content of developers after eight minute agitated development with the equivalent of 32 ft. of film per liter. The developing formula was sodium sulfite, varied; metol, 2.5 g /1; borax, 5 g /1.

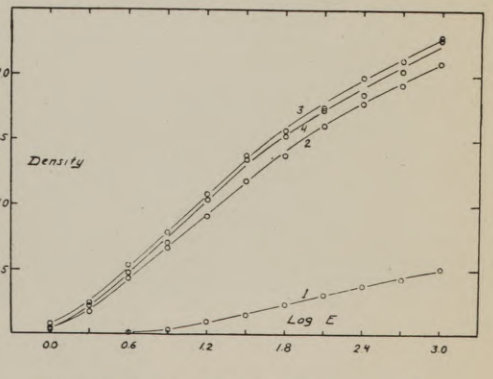
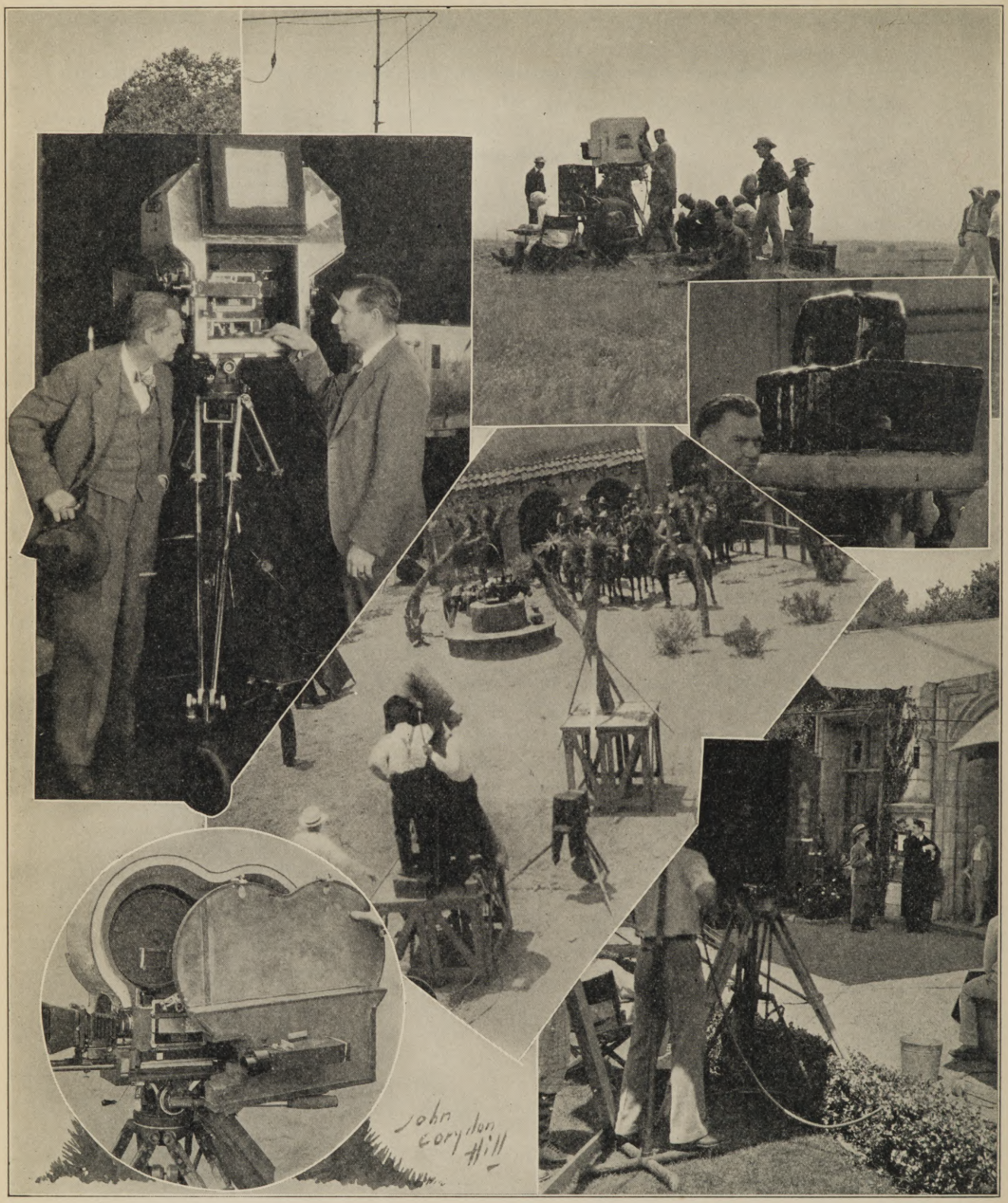


Fig. 4. Eight minute developments with: Sodium sulfite, 75 g /1; metol, varied; borax, 5 g /1; hydroquinone, varied. Emul. 2568.

Curve No.	Metol	Hydroquinone	Fog
1	0	20	.07
2	2.5	0	.07
3	2.5	5	.08
4	2.5	10	.10



See What Sound Did to Cameras!

ABOVE WE SEE *a few of the contrivances devised by cameramen to silence their cameras. Upper left is John Arnold, A. S. C., explaining his "Bungalow" to Director Lionel Barrymore. Upper Right is Paramount's "Baby Booth" on on location. Center is Fox camera, with its horse-blanket. Lower left is R.K.O. device called "Blimp." Lower right is Paramount "Baby Booth." Just under the upper right is Pathe's device.*

SOLVING THE "ICE-BOX" PROBLEM

Cinematographers Show Remarkable Ingenuity in Various Devices They Have Worked Out to Bring the Cameras Out of Sound Booths.

By WILLIAM STULL, *A. S. C.*

EVER SINCE the first Vitaphone experiments, one of the chief technical problems has been the reduction of camera noise. Even the best of pre-talkie cameras were too noisy for sound work, and though they were completely remodeled, and every possible source of noise muffled, they were still loud enough to seriously interfere with the microphone. Obviously, the only solution of the problem was to isolate them from the microphones, and E. B. DuPar, A. S. C., who photographed the first Vitaphone subjects, found himself confronted with the problem of doing this at the very start of his work.

The result was the camera booth, a small, portable, sound-proof room into which camera and cameraman were locked while working. The scene was photographed through a large window of optically plane glass at the front of the booth, while entrance was through a door at the rear. The matter of ventilation was quite overlooked in the first booths, and not greatly improved even in the later ones. But these later booths, however, as sound production became general, evolved into comparatively palatial affairs. The current models are much larger than their predecessors, and usually hold two cameras, which are mounted on an adjustable shelf rather than on tripods. The ventilation is much better, and is often aided by small electric fans, air-hoses, and so on, while communication with the outside world is maintained through a telephone.

None the less, camera booths of any sort are highly unpopular with cinematographers. This is not only because they are at best uncomfortable things to work in, but because they seriously restrict and harm the quality of the camera work. Naturally, the size of the booth completely eliminates any possible mobility, as well as restricting their placement for angle-shots. Also, the glass through which the scenes are photographed acts as a diffuser, and gives "talkie" photography its objectionable "mushy" quality. Cameramen don't particularly mind enduring necessary personal discomforts, but when the quality of their work is jeopardized, they rise in unanimous protest. In this case their protest has taken tangible form, and given concrete evidence of the ingenuity and persistence of the industry's technicians. Practically every technical staff in Hollywood has attacked the problem of doing away with the booth. The actual devices resulting from this work are different in each studio, but they are all recognizable as springing from the same urge, and toward a common goal. In every case the same principal aims have been in the designers' minds:

1. To do away with the booth.
2. To restore the camera's mobility.
3. To eliminate the glass window.

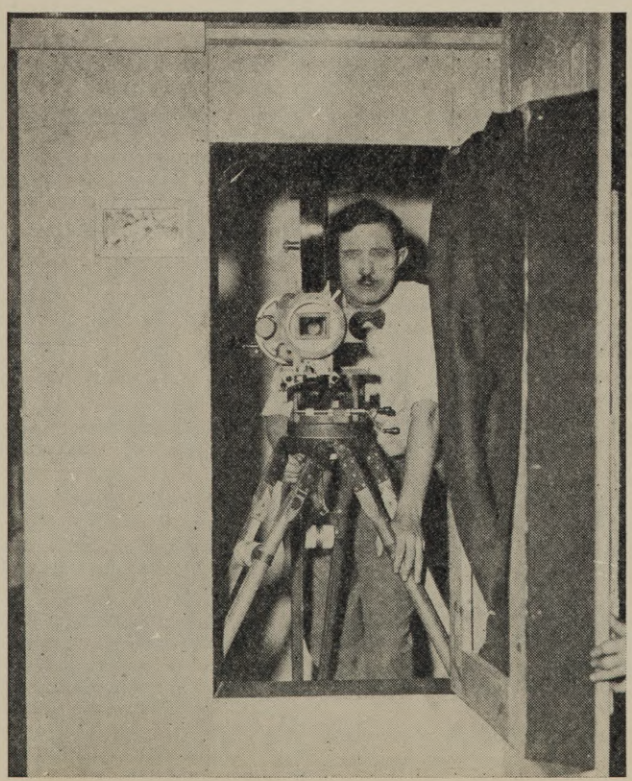
Probably the earliest of these devices, and one of the most successful, is the "Bungalow" invented by John Arnold, A. S. C., and in general use at the Metro-Goldwyn-Mayer studio. Reduced to its lowest terms, the "Bungalow" is a small, sound-proof enclosure built around a Mitchell High-speed camera, and mounted on a steel tubular tripod which rolls on rubber-tired wheels. It is made of sheet lead over an iron frame, and lined inside with sound-deadening sponge-rubber. Large doors on either side and behind give easy access to the various controls of the camera, while in front, the window is replaced by a removable plate faced with sponge-rubber, which fits tightly around the lens, damping any noise that might come out that way. The matte-box is placed on the outside of the bungalow, as is the finder, while the driving motor, being a separate unit in the Western Electric system, has its own little bungalow and tripod, and is connected with the camera by a heavy, flexible-cable drive. For ease of manufacture, the outfit is startlingly angular, and looks decidedly like some cubist's concept of a camera, but it is none the less an essentially practical device, made by an intensely practical man, for practical use.

When asked about his invention, Mr. Arnold's reply was characteristically modest. "Well," he said, "I saw that something had to be done to get us out of those infernal booths, so I just keept at it until I got something I knew would work."

How well it works is evidenced by the fact that the studio uses the "Bungalow" for all purposes, to the almost complete exclusion of booths. Furthermore, the improvement in photography since their adoption is even more conclusive evidence of its success.

Walter Lundin, A. S. C., the chief cinematographer for Harold Lloyd, has modified the "bungalow" to meet his special requirements, and is using it with complete success on Lloyd's current picture.

At the RKO studios, Don Jahraus, the head of the miniature department, has evolved an equally successful device, though one of an entirely different aspect. His "Blimp Camera" is simply a covering for the camera, and fits on any standard tripod. It is made of a frame of Yucca, lined with sponge-rubber, and covered with rubber sheathing. Due to the pliability of its materials the shape of the "Blimp" approximates that of the camera, while its lightness—only 30 lbs. —makes it the lightest camera cover in general use. The lens, as in the Arnold "Bungalow," is muffled in sponge-rubber, eliminating the undesirable window. The finder is also outside the "Blimp," but the motor is kept inside, as that studio uses the Photophone system.



E. B. DuPar, A. S. C., in camera booth used in filming the First Vitaphone picture.

As a unit, the "Blimp" is undoubtedly the lightest and most mobile in general use today. It has lately been modified for use with the Western Electric system by George Barnes and Gregg Toland of the Samuel Goldwyn Co.'s camera staff. As that company still uses booths for much of the interior work, the glass window is retained in the "Blimp" to preserve a matched photographic quality throughout. They have also considerably enlarged the device, giving more convenient working-space within.

As in the original "Blimps," access to the camera is by a large door at the back, while the left side is completely removable for loading, etc. The finder is enclosed in the body of the "Blimp" and an ample window

(*Continued on Page 36*)

JUNGLE

By

A. Kinney Griffith

Illustrated by John Corydon Hill

JAVA-HEAD—the fierce tropical sun beat down on the virgin jungle—a tangle of giant banyans, camphor, and ebony trees, interlined with chonta, nibung, areca and nipa palms, with an undergrowth of sapang, rattan, bamboo, and a matting of beautiful orchids growing wild and in a gorgeous array of colors. The heart of equatorial jungle, it was a primitive land where nature ran riot, where the struggle for existence was eternal, inevitable, deadly.

From a narrow trail, leading from Paga-Junstan to the shoreline, emerged a Javanese coolie and a girl. On the coolie's face was the look of a hunted man. On the girl's face was an expression of fear.

The coolie, a huge, powerful, gorilla-like man, wore only a short red sarong and carried a small canvass bag in his right hand. A long kris and several parang spears hung from his massive shoulders. He held the girl's hand in his left and jerked her to him, as he gazed quickly toward the trail they had left behind.

The girl, nude except for tightly fitting breech-clout and rattan sandals, was young, lithe, slender and beautiful after the fashion of the south sea islander who boasts of white-blood heritage.

For a moment they stood motionless, listening to sounds coming from the jungle trail. Then the giant gorilla-like coolie gave the girl another jerk, dragging her forward at a brisk run up the beach to where a high coral reef extended from the surf to a sharp cliff partly hidden by jungle foliage. Soon they entered the jungle near the cliff-side and disappeared from view.

Several minutes later another man emerged from the trail and stopped short on the beach. This man unmistakably was white. It was Trelawney Douglass. Dressed in a white pongee suit and pith helmet, he was typical of the young American adventurer who is often found in the far-away places of the earth. He carried a high-powered rifle and from his belt hung a short Malay kris. His face and hands were sunburnt to the hue of old leather. His blue eyes, as he gazed at the footmarks left by the former two, had an ominous glitter in them.

Without pausing any longer, he turned and ran up the beach on the trail of the coolie and the girl. He too turned at the cliff-side and disappeared from view.

The American plunged into the jungle and found a faint trail leading along the base of the cliff. For a time he followed this trail at a brisk walk, ever watchful for footprints of the two people who had passed before him, and alert for the venomous reptiles and ferocious beasts that infested the Java jungle.

AFTER two hours the trail began to mount toward a far-off tableland that formed the backbone of the island. Coming to a tall chonta palm beside the trail, Douglass dropped his weapons and quickly climbed the palm to its top. There, a hundred feet above the humidity of the dense jungle, he drew a deep breath and let his gaze wander over the jungle top.

In the distance, possibly two miles away, he beheld two tiny figures hurrying along the trail which lead toward the tableland. His lips moved in a silent curse; he knew what it meant when he saw those moving figures on the inland trail. He knew the instinct of the giant coolie, a Samarangan—son of the Samarangan head-hunters—now making the trek toward his jungle home-land.

Again Trel's lips moved, then set in a grim line as he slid back down the long bole of the palm tree. Picking up rifle and kris, he struck out in a steady run on the trail of the girl and the coolie. Another hour passed as Trel plunged on. The scorching sun shone down. Heat waves danced and mirages appeared before his burning eyes.

Suddenly the sound of a human voice came to him from the trail ahead. Instantly he stopped in his tracks and his rifle came up, alert. Seeing nothing, he advanced cautiously. The human sound became more distinct, then he identified it as the voice of someone pleading for mercy or help. Then the pleading voice changed to one of pain, a note of distress. It was the girl's voice.

It spurred the American to reckless fury. Like a wild man he broke into a full run and plunged through the jungle trail. The force of his body swishing against the foliage, the snap of his steps in the trail made much noise, but he did not care. The only thing that mattered was that he now saw the end of his quest. The end. Here in the jungle wilderness, instead of in the Samarangan hinterlands where his blond head would make a prized possession for some dusky chief to flaunt before his harem.

TREL DOUGLASS burst from the trail unto a tiny clearing around a wild-beast watering hole. There was nobody in sight as he stopped short. There was not a sound anywhere in all the jungle. Mystified, he looked all around him, and then came the swish of a hastily flung spear.

Trel dodged instinctively and the murderous weapon passed overhead, missing him by inches. Before any more spears could be thrown, he sprang forward, desperately. Behind an ebony tree, he found where the spearman had stood; but now, only the inscrutible silence of the jungle greeted him. The rustle of a leaf, then he whirled quickly—again in time to avoid another parang spear. This one came from the right and was followed instantly by a diabolical roar and the mad plunge of the huge Javanese coolie brandishing a glittering kris.

The American barely had time to whirl and fire one snap-

shot from his rifle. Instantly he knew that the shot had missed its mark. Then the writhing fury of the Javanese was upon him, knocking the rifle away with one terrific sweep of his huge hairy arms.

Avoiding the kris, Trel lashed about in desperation, driving his fists about like rapiers, but his defense was weak—almost useless against the enormous strength of the coolie. He managed to batter the small cannibalistic eyes of the native until he drew grunts of pained fury, but he could not weaken the coolie's strength nor keep away from his terrific lunges.

The coolie dropped his kris and wrapped his arms around the white man's waist. Both toppled to the ground. As he struggled vainly to break the giant's hold, Trel saw the girl drag herself toward the melee and pick up the long kris. Nearer she crept, as the men fought and thrashed upon the ground. Then the girl straightened up and aimed the kris for the broad back of the coolie.

There came the roar of a fiend incarnate as the giant gave one more jerk at the white man's back. Then Trel felt himself falling into a black pit that seemed full of shooting stars.

A BESTIAL scream and a diabolically harsh yell snapped Trel back to consciousness. The savage yell was followed by a bellowing roar, more screams followed, screeches, more piercing and fearful than the first.

Pain shot through his battered back as he sat up and looked into the jungle toward the sounds. In great agony he struggled upright, bending his back several times to work out some of the soreness. Barely able to walk, he staggered off in the direction of the yells that were becoming horribly appealing.

A dozen steps and he broke into a stumbling run. Pain retarded his movements and the jungle was so dense he could not see more than ten feet ahead. This genuine fright caused him to stop in his tracks, struck with astonishment. A gruesome scene was being enacted before his eyes and momentarily holding him spellbound. The coolie and the girl were directly ahead—the girl lying face down on the ground, the coolie wrestling in the embrace of a monster black-maned Bengal tiger!

Both man and tiger were thrashing around with frightful ferocity, the tiger snarling viciously, the coolie emiting agonized yells with blood-curdling rapidity.

Trel was watching that giant gorilla-like man as if something had hypnotized him. The mighty muscles on the coolie's hairy back and legs were bulging as if about to burst. One instant the coolie was atop of the tiger, next instant the beast was on top, clawing and snapping at the coolie's throat.

Man and beast changed positions with lightning quickness. Blood flowed freely. The savage snarls became more hideous as the tiger scored with teeth or claw, and the coolie retaliated with a swift stab of his kris.

Trel, his rifle lost in the former scuffle, drew his short kris and jumped in close to the combat to get a blow at the tiger. He missed his aim and had to jump away to avoid slashing the coolie. Just then the tiger dealt the coolie a stunning blow that sent him spinning to the earth. The Bengal sprang with a clear way to the coolie's juglar vein. Blindly he struck out to defend himself, but his strength was waning.

Trel rushed forward and swung the kris in a wide arc. *Zoom*, came the kris, and *whack* through the tiger's neck near the base of the head. It was a powerful blow, nearly severing the beast's head from its body. Blood gushed out and down into the coolie's eyes and face. The tiger lunged in the death throes and with its powerful claws ripped the coolie from head to groin. There came a groan from the Javanese that sounded like paleolithic anguish, then again all was still in the jungle. The Javanese laid on his back and his chest worked up and down forcing respiration in gigantic drafts. A full minute he lay thus, while Trel rushed over and

(*Continued on Page 46*)

"Trel, Sahib," said the Coolie, "Me damn fool."

As the Editor Sees It

Hoof and Mouth Disease

ONE of the most delightful evenings this writer has experienced in years was the night he went to Warner Brothers' Theatre in Hollywood to see and hear Al Jolson in "The Singing Fool."

Unashamed, the writer wept with the other hundreds as the inimitable Jolson, the comedian, rose to the heights of tragedy. The cross-section of the life of a singing waiter who rose to fame was interesting, intriguing and novel. In other words, Warners had given the public something different; and, with Vitaphone, had enabled the vast public to hear the singing of Jolson.

Then came the sheep!

The public had received a singing picture with open arms—and purses. So the great producing minds decided that there should be more singing pictures. Pictures showing life behind the scenes. The hearts of the chorus girls must be bared, along with their legs, so often ill-shaped and bowed.

Some were excellent, some were good, some were bad and others should have died a-borning.

Girls! girls! girls! Dressing rooms! Half-clad girls! Spiral stairways down and up which crowds of girls scamper with lead in their aching hearts—apparently also in their aching feet! Footlights before which you see a long line of under or over-nourished calves! Long lines of girls in short dresses doing dances apparently limited to the few steps the stars can do! Squeaky voices laboring like a suffering woman to reach notes never meant for them!

What a relief to sit in a theatre and see and hear a picture like "Dynamite."

The writer hesitates when someone suggests a picture show, because he fears he will see another "hoof and mouth" affair. Even another court trial would be better, although it does seem a shame to turn our theatres into courthouses. However, even that is better than trying to turn them into fourth-rate musical comedy halls. We have had sufficient musical comedies for a while.

Some companies are planning glorified "Westerns" in talkies. May they be blessed forevermore! Give us the great open spaces of the wild and woolly West any day in place of the countless lines of open mouths and apparently weary feet of ambitious extra girls who overnight try to look like New York show girls.

Service

REALIZING that there is a crying need for a remedy for the present chaotic aperture variation that is adversely affecting theatres in the United States, members of the great body of technicians have again come to the front in an effort to do something that will be of material benefit to the motion picture industry.

The American Society of Cinematographers, the Technicians' Branch of the Academy of Motion Picture Arts and Sciences, and the Pacific Coast branches of the Society of Motion Picture Engineers and the American Projection Society are the organizations fostering this move. A committee has been appointed, composed of members of these organizations; and they are undertaking the investigation and comparison to draw up a set of standards for camera and projector apertures which it is hoped will do away with the present condition.

This is a very commendable step on the part of these technical bodies, and is typical of the spirit that is found among this great group of men. Always, when the industry faces a technical crisis these men can be depended upon to step into the breach and save the day. They do it solely in a spirit of honest helpfulness and interest in the welfare of the industry. They do it "on their own time," after they have worked their required number of hours at the studios.

When talkies presented the problem of incandescent lighting it was the American Society of Cinematographers and the Academy that came forward and by their experiments advanced the talkies by proving the worth of incandescent lights.

And now when a crisis in the aperture situation arises and we see the tops of scenes clipped off in the theatres, these men are again solving the problem.

This is real service. Let us hope that the "powers" of the picture industry will some day realize the worth of these men; will appreciate the fact that they are the life-blood of the industry and will give them the material reward that should be given for service.

Scenario Writing for Amateurs

ONCE in a blue moon an inspired soul sits down at a typewriter and produces a piece of work that means something more than a collection of words. Not often, 'tis true.

Since the advent of the 16 mm. camera for use of amateurs, the world and his wife have been writing this and that with the hope, apparently, that the amateurs would pour out the American dollars for same. There have been some good volumes printed, it is true; volumes that are of material assistance to the home movie maker.

And now comes another book. It is "Scenario Writing and Producing for the Amateur," by Marion Norris Gleason, published by the American Photographic Publishing Co., of Boston.

A careful perusal of this volume leads the writer to give it the stamp of approval and say that the writer of this book has given the amateur something that should be really not only interesting but decidedly helpful. Written in clear and simple English, the writer contributed something that is instructive, and it should be of great influence in amateur circles.

Pictures in College

THE University of Southern California is to be congratulated upon its decision to emphasize the importance of the motion picture. When the Fall term opens, a new course will start in "Social Aspects of the Motion Picture."

There will be laboratory work and lectures. The "labs" will be motion picture studios in Hollywood. Profesor B. V. Morkovin will head the new course. He has been doing research on the subject for the past three years. An interesting angle which he has been studying is methods of detecting scientifically the kind of motion pictures that makes the greatest "hit" with the greatest number of people at a certain period, from both an artistic and social standpoint. We imagine many a studio ear will be glued close to this course.

The University of Southern California last year took a forward step in instituting courses dealing with motion pictures; and is one of the first universities to give the cinema serious consideration. Progressive heads are leading this university along its path, and show common sense by realizing that motion pictures are a big factor in life of today.

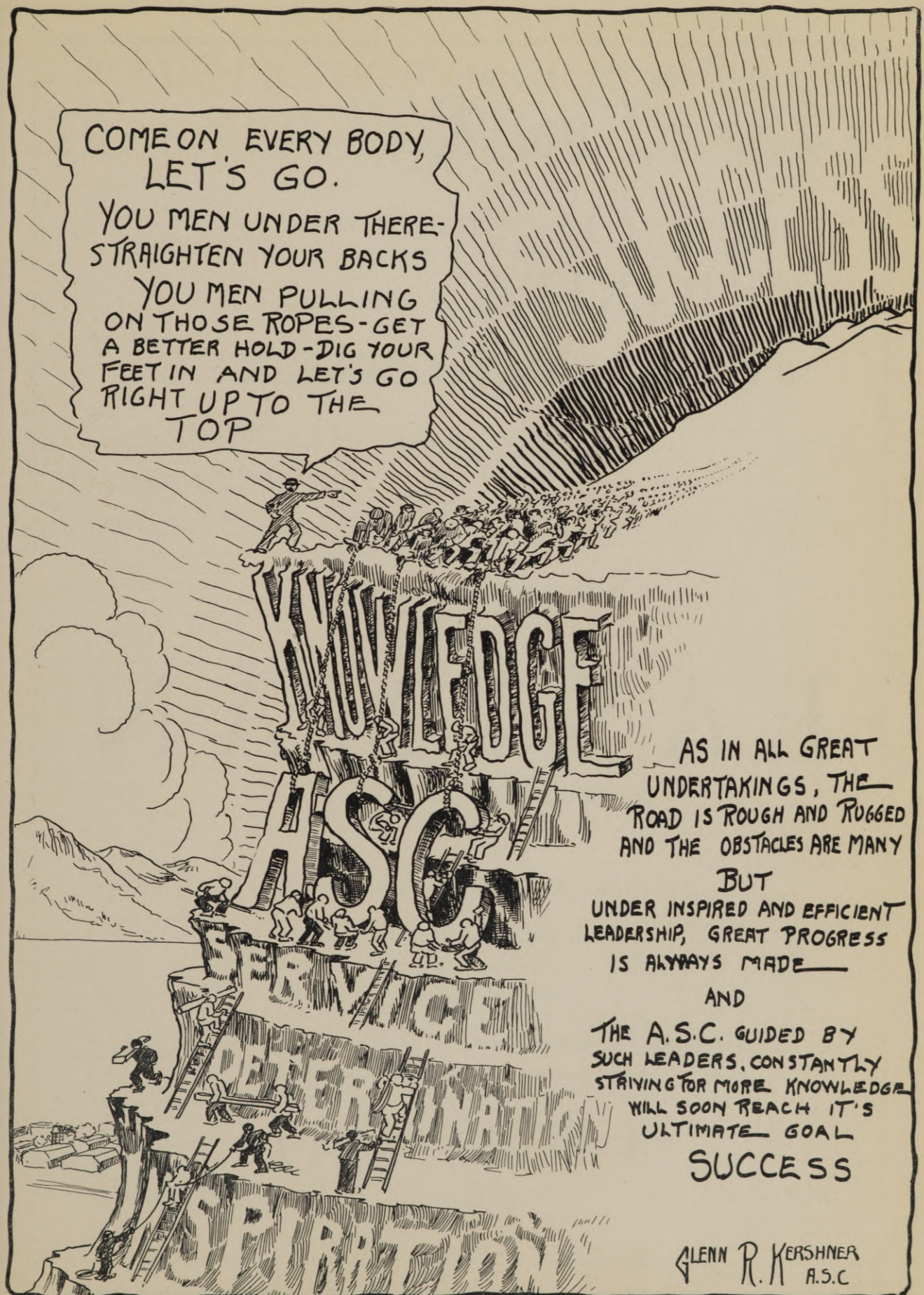
Thank You!

ONE of our readers sent us an interesting letter recently in which he congratulated us upon our decision to give the amateur Cinematographer an important niche in our scheme of things in this magazine.

"You show real vision," declared this reader, "in emphasizing the amateur department. Surely no organization in the world can do more for the amateur than you of the A.S.C. We amateurs appreciate what you are doing, and we appreciate the opportunity to keep in touch with the professional.

"Without doubt, the amateurs will contribute something really great in cinematography some day in the future. But they need the teaching and aid of the professionals as they start to creep along cinematographic paths. I, for one, realize the great benefit your magazine is to us."

Words such as those are inspiring to those of us who are really trying to be of service. The general rule, however, is to receive only adverse criticism. It seems strange, but is true, that most people think there is but one kind of a comment. When we do receive a kind word it warms the heart and makes us glad we are an editor. To say we are thankful is putting it mildly.


COME ON EVERY BODY, LET'S GO.
YOU MEN UNDER THERE- STRAIGHTEN YOUR BACKS
YOU MEN PULLING ON THOSE ROPES - GET A BETTER HOLD - DIG YOUR FEET IN AND LET'S GO RIGHT UP TO THE TOP
KNOWLEDGE
A.S.C.
SERVICE
PERFECTION
AS IN ALL GREAT UNDERTAKINGS, THE ROAD IS ROUGH AND RUGGED AND THE OBSTACLES ARE MANY
BUT
UNDER INSPIRED AND EFFICIENT LEADERSHIP, GREAT PROGRESS IS ALWAYS MADE
AND
THE A.S.C. GUIDED BY SUCH LEADERS, CONSTANTLY STRIVING FOR MORE KNOWLEDGE WILL SOON REACH IT'S ULTIMATE GOAL
SUCCESS
GLENN R. KERSHNER A.S.C

SOME PROPERTIES OF FINE-GRAIN MOTION PICTURE FILM DEVELOPERS

Part Three of a Paper Presented at the Spring Meeting of the Society of Motion Picture Engineers at New York City, May 6 to 9, 1929

By H. L. CARLTON *and* J. I. CRABTREE

This is the final installment of Communication No. 388 from the Kodak Research Laboratories, Rochester, N. Y. The first part appeared in the July issue of the American Cinematographer. The second appeared last month. If any reader missed the other installments he may secure the back numbers through this office.—Editor's Note.

SEVERAL investigators have studied the fine grain producing properties of the Eastman borax developer. Its ability to produce fine-grained images is undoubtedly a result of the presence of a high content of sodium sulfite which exerts a solvent action on the silver halide grains, reducing their size and preventing clumping.[15] Namias[16] concludes that the rate of development is too low for practical purposes and claims that his recommended developer (formula 13, Table VI) gives equally fine-grained images with an increase in rate of development. Lumière and Seyewetz[17] found that the images produced by the borax developer are finer-grained than those produced by the same developing constituents used with carbonate as the alkali. Veldman[18] concluded that the borax developer gave very fine-grained images but no finer than the following developer: Elon 15 grams; sodium sulfite (anhydrous) 150 grams; potassium bromide 2 grams; water to 1 liter. This developer is impractical because of the loss in emulsion speed caused by the high bromide content. He varied the sulfite content from 0.5 to 320 grams per liter and found that the graininess decreased as the sulfite content increased. Lüppo-Cramer[19] found that with the Eastman borax developer fine-grained images were not obtained with all silver bromide emulsions. Emmermann[20] in a series of tests on motion picture film found that the Eastman borax developer was the best formula known for producing fine-grained images. Hauck[20] concludes that the low alkalinity of the borax developer contributes indirectly to the production of fine-grained images because the relatively low rate of development permits the sulfite to exert more solvent action which progresses with time. Although the normal borax developer formula gives satisfactory fine-grained images, experiments were made to determine the possibility of securing even finer-grained images and to study the effect, on graininess, of varying the composition of the developer and the time of development.

(A) *Method of Measuring Graininess*

An 8½ x 11-inch sheet of Kodaloid was divided into nine equal rectangular areas. A step tablet was made by covering the areas with pieces of neutral gray gelatin having densities ranging in steps of 0.3 from that obtained with film base (0.02) up to 2.4 inclusive. This tablet was then mounted on the easel of a title camera and illuminated from behind with the light from two 1000-watt lamps diffused with ground glass. A length of film was exposed in the camera and then used as a standard for testing the graininess produced by the experimental developers. With normal development this negative gave nine uniform areas per frame with densities ranging from 0.15 to 1.4.

Half-gallon glass battery jars were used for holding the experimental developers and four jars were handled as a unit in a constant temperature water bath. A miniature wooden rack was used holding fifty inches of standard film. To test a series of developers, one rack of the standard negative was developed to the same gamma in each of the trial developers. Each of the 50-inch negatives was spliced into a loop and a 30-foot print made from each for projection. The prints were all given the same time of development.

(B) *Experimental Results*

A series of experimental developers was compounded in which the concentration of each of the constituents was varied over a wide range. Each was compared with the standard borax formula. The conclusions indicated in Table VI were drawn from the prints projected under normal projection conditions.

(C) *Discussion of Data*

The following general conclusions have been drawn from a long series of graininess tests on trial developers.

(1) For a constant degree of development the graininess decreases as the sulfite content of the developer increases from 25 to 200 grams per liter. In the range between 25 and 100 grams of sulfite per liter there is a marked decrease in graininess and a slight definite improvement occurs in the range from 100 to 200 grams per liter.

(2) If the sulfite content of the developer is maintained constant and the concentration of one of the other constituents is varied so as to alter the rate of development, the graininess for a constant degree of development decreases as the rate of development decreases. For example, if the quantity of developing agents and borax is halved so that the rate of development is decreased, the graininess decreases because, in order to secure negatives having a given contrast, development must be prolonged during which time the sulfite can exert a greater solvent action and therefore reduce the graininess.

The total solvent action of a developer on the emulsion can be increased in two ways, as follows:

(*a*) By increasing the sodium sulfite content;

(*b*) By decreasing the rate of development so that the negative is in contact with the developer for a longer time and the sodium sulfite present has more time to exert a solvent action.

The solvent action, however, cannot be carried to the extreme without detracting from some of the other good qualities of the developer. A very high concentration of sodium sulfite causes an excessive quantity of silver halide to be dissolved and this is accompanied by increased sludge formation. A badly sludged developer is objectionable because it leaves a residue on the negative which is not readily removed in the wash water and is very difficult to remove in the drying room. Moreover, the formation of sludge is a development process and not only depletes the supply of developing agents, but builds up the reaction products of the developer which inhibit the process of development. Therefore, as the solvent action of a developer is increased its useful life decreases because a large percentage of the developer is wasted in the formation of sludge.

Hypo is also a solvent for the silver halides and has been used successfully in some developer formulas containing caustic al-

Table VI

Variations in Graininess Produced by Varying the Components of the Borax Developer

No.	Elon	Hydroquinone	Sodium Sulfite	Borax	Boric Acid	Sodium Sulfate	Time of Development	Graininess
1	2	5	100	2	(Standard Developer)		10¼ min.	Average
2	2	5	100	2	14		19 "	Very good
3	2	5	100	8	8		9¼ "	Average
4	2	5	100	14	2		7 "	Poor
5	2	5	25	2			8 "	Very poor
6	2	5	50	2			8 "	Poor
7	2	5	150	2			12 "	Very good
8	2	5	200	2			15 "	Very good
9	2	0	100	2			12 "	Average
10	0	10	100	20			16 "	Average
11	1	25	50	1	Sodium Carbonate		15 "	Poor
12	1	25	100	1			15 "	Very good
13*	5	0	50		5		5 "	Poor
14	2	5	100	2		100	15 "	Good
15	2	5	50	2		100	15 "	Average
16	2	5	25	2	Eyko	100	15 "	Poor
17	2	5	25	2	0.5		13 "	Poor
18	2	5	25	2	1.0		11 "	Good
19	2	5	25	2	2.0		19 "	Good
20	2	5	25	2	4.0		28½ "	Average

*Namias developer used with 5 c.c. of phenosafranine 1:1000 per liter.

kalis. The last four tests recorded in Table VI were made to ascertain if small quantities of hypo could be used in the same way that relatively large amounts of sodium sulfite are used to produce fine-grained images. Just enough sodium sulfite was used in a developer formula to act as a preservative for the developing agents.

Hypo is a very active silver halide solvent and the concentration that can be used is critical. One gram per liter was sufficient to produce very fine-grained images. The higher concentrations, although giving satisfactory graininess, dissolved so much of the silver halide that they appreciably decreased the speed of the emulsion.

Theoretically, the hypo which combines with the silver halide to form the soluble silver halide hypo complex salt should be regenerated when the combined silver is reduced so that the concentration of the hypo should remain constant as the developer is used. The advisability of the use of hypo in this type of developer, however, is questionable.

(3) If the concentration of the developer is kept constant, the graininess decreases with the degree of development. A series of test exposures was developed at two-minute intervals from six to twenty-four minutes. To test the relative graininess of these negatives the positive development times were varied so as to make matched prints from the high and low gamma negatives. The prints were developed in the motion picture positive developer (Formula D-16) with the following results:

TABLE VII

Negative Development Minutes	*Gamma of Negative*	*Positive Development Minutes*	*Virtual Gamma of Print*
6	0.39	8.5	0.70
16	.80	3.5	.80
8	.46	8.5	.78
18	.86	3.5	.78
10	.54	8.5	.96
24	.98	3.5	.88

As shown in the table, the prints were matched for six and sixteen, eight and eighteen, and ten and twenty-four minute negatives to give practically the same virtual gammas (product of gammas of positive and negative). For each pair of negative development times the higher degree of development gave more graininess than the lower one.

The above tests indicate therefore that the graininess of prints made at a constant virtual gamma is not constant but increase with the degree of development of the negative. From this it must be concluded that increasing the degree of development of the negative increases the graininess far more than increasing the degree of development of the print. In other words, the graininess-gamma curve for the negative material over the useful range of gammas (0.5 to 1.0) appears to be straight and rather steep, while the graininess-gamma curve for the positive (gammas of 1.2 to 2.2) has a long shoulder which must be almost parallel to the gamma axis. Further work is in progress in this connection.

(D) *Practical Applications*

The proportion of sodium sulfite in the published formula for the borax developer is very satisfactory for the rack and tank method of development where the same developing solution is used over a period of two or three weeks. It gives the minimum graininess that can be obtained with the quantity of sludge that can be tolerated with this type of developer.

In the case of commercial film laboratories where several tanks of developer are exhausted in one night, different conditions prevail since with the normal developer more than five hours are required for the sludge formation to take place. If the developer is exhausted quickly it is possible to use a higher concentration of sulfite and obtain finer-grained images throughout the life of a developer.

Use of the Borax Developer with Motion Picture Positive Film

Extensive tests have indicated that the graininess of images produced by the borax developer is not appreciably less than that of images obtained with the formula D-16 recommended for the development of Eastman motion picture positive film. In many cases, however, the borax developer is to be preferred for the following reasons:

(*a*) It may be used with safety for developing positive film on a reel because the high concentration of sodium sulfite prevents the formation of aerial fog.[5]

(*b*) The rate of development of positive film with the borax developer is relatively slow so that it is to be preferred when a low degree of development is required. From Table VIII it is seen that a maximum practical gamma of 1.7 is obtained with Eastman positive film in 23 minutes at 70° F. as compared with a maximum gamma of 1.93 obtained in 11 minutes at 65° F. with Formula D-16.

TABLE VIII

Time-Gamma Measurements for Positive Film Developed in the Borax and D-16 Developers by the Rack and Tank Method at 70° F.

BORAX DEVELOPER		D-16 (ELON-HYDROQUINONE)	
Time	*Gamma*	*Time*	*Gamma*
11 min.	1.25	3 min.	1.0
14 min.	1.45	5 min.	1.45
17 min.	1.62	7 min.	1.72
20 min.	1.68	9 min.	1.90
23 min	1.72	11 min.	1.93
26 min.	1.72	13 min.	1.95

For any given developer formula the rate of development and maximum gamma depend on the temperature of development, the nature of the emulsion used, the degree of exhaustion of the developer, and the degree of agitation of the film, so that with machine development the above maximum gammas would be somewhat higher. The rate of development may also be modified in the same manner as outlined on page 7.

Prolonged development in the borax developer beyond twenty minutes at 70° F. is not advisable owing to the fact that the fine-grained positive emulsion is appreciably soluble in concentrated solutions of sodium sulfite. Unexposed positive film will fix out completely in from 60 to 90 minutes at 70° F. in the borax developer, although some dichroic fog is simultaneously formed.[7]

The life of the developer with use is somewhat shorter than for negative development owing to the greater solubility of the fine-grained positive emulsion which therefore causes greater sludge formation and a relatively more rapid exhaustion of the developer. It may, however, be revived in the same manner as when used for motion picture negative film.

V. *Summary and Practical Recommendations*

(A) For the rack and tank method of development when one tank of developer is used over a period of two or three weeks the following formula as previously published[1] is very satisfactory:

	METRIC	AVOIRDUPOIS
Elon	2 *grams*	2 *lbs.*
Hydroquinone	5 *grams*	5 *lbs.*
Sodium sulfite (anhydrous)	100 *grams*	100 *lbs.*
Borax	2 *grams*	2 *lbs.*
Water to	1 *liter*	120 *gal.*

About 80 feet of negative motion picture panchromatic film can be processed per gallon before the developer needs revival. During this time the fog or veil will decrease considerably, the speed of the emulsion will drop to about 60 per cent of its value in the fresh developer, and the time of development for a given contrast will increase from 20 per cent to 30 per cent.

After 80 feet of film have been processed per gallon, the developer can be revived with half the original quantities of Elon, hydroquinone, and borax dissolved in hot water with enough sodium sulfite to make its concentration in the reviving solution equal to 10 per cent. For the revival of a 120-gallon tank of developer one pound of sulfite and then one pound of Elon are dissolved in two gallons of hot water, one pound of sulfite and two and a half pounds of hydroquinone in two gallons of hot water, and three pounds of sulfite and one pound of borax in two gallons of hot water. These three solutions are added to the developer tank and mixed thoroughly.

An additional 80 feet of motion picture film per gallon can then be processed in the revived developer without any serious drop in the speed of emulsion. Further use of the developer may give a serious drop in the speed of the emulsion.

(B) The graininess of images produced by the borax developer can be improved in three ways:

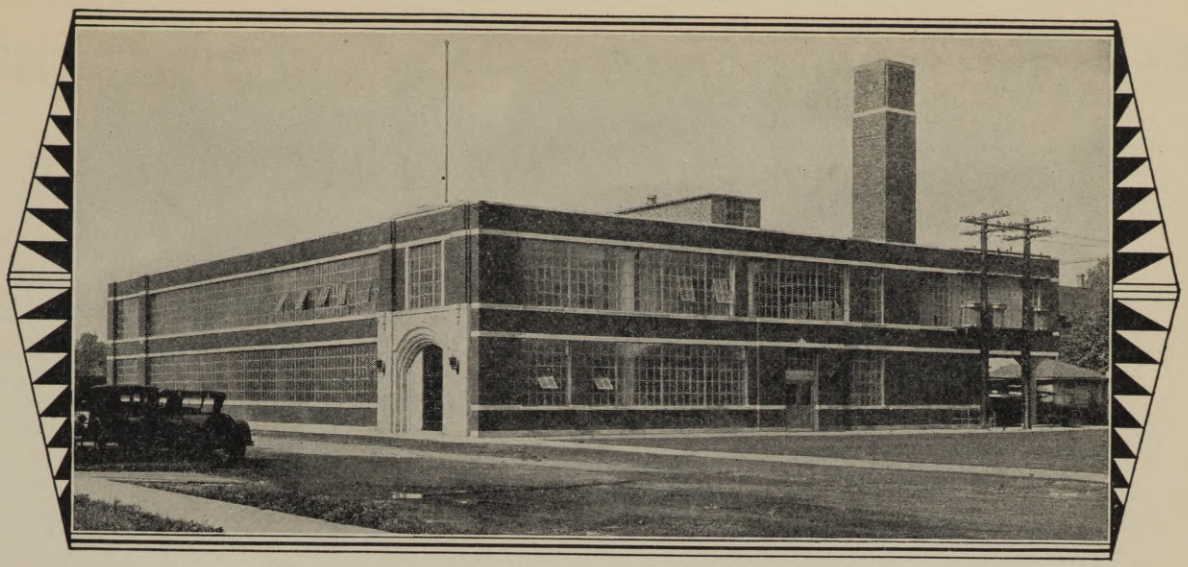
1. If the rate of development is held constant, the graininess for a constant degree of development can be improved by increasing the concentration of sodium sulfite to give increased solvent action.

In processing laboratories where a developer is used continually for one night and then discarded, the sulfite content can be increased to 150 grams per liter. This developer is recommended only in cases where it can be exhausted rapidly and thrown away before it has time to sludge excessively.

2. If the sulfite content of the developer is held constant, the graininess for a constant degree of development can be improved by decreasing the rate of development. This is done by decreasing the alkalinity of the developer or reducing the concentration of the developing agents.

3. The graininess of an image on negative motion picture film developed in the borax developer increases as the degree of development (gamma) of the image increases. In the case of positive motion picture film, however, graininess appears to increase as the degree of development increases up to a certain point and then increases only slightly, if at all. From the standpoint of graininess, therefore, for a given virtual gamma of the positive (product of negative and positive gammas) it is preferable to develop the nega-

(*Continued on Page 41*)



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Dedicated to the Development of the MOTION PICTURE INDUSTRY

A MONUMENT to the future progress of America's third industry now stands in Chicago. It is the Bell & Howell Engineering Development Building.

For twenty-two years Bell & Howell have been associated with the development of motion picture making and projection. For twenty-two years this company has sponsored improvement after improvement in ciné cameras and projectors. And today its obligation for study, research, experiment, and invention has outgrown the quarters allotted in the Bell & Howell production building.

Hence this new structure of more than 35,000 square feet of floor space, costing more than a half million dollars, and equipped with the latest machines and facilities. Here a competent staff of motion picture engineers, under the direction of Mr. A. S. Howell, has the equipment for even greater endeavors, for still more important contributions to the advance of motion pictures.

The Bell & Howell Production Building, 1801 Larchmont Ave., Chicago

The new Bell & Howell Engineering Development Building has been erected for and is put at the disposal of the entire industry. Assignments on any phase of new motion picture development are invited.

BELL & HOWELL

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CHICAGO, ILLINOIS
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ELECTRO-MAGNETIC RECORDING OF ACOUSTIC PHENOMENA

Noted German Scientist Discusses Recording and Reproduction of Sound on Steel Wire or Ribbon

[This is an abridged free translation from a report of Dr. Curt Stille, printed in the excellent German magazine, "The Filmtechnik," No. 9, pages 191 to 194. It is presented here because of the unusually interesting subject matter.—Editor's Note.]

A LENGTHY introduction to the report explains as to how it sometimes takes years and even decades of constant developing before an idea has reached a state of completion which may be called perfect.

The idea being discussed relates to the solution of the problems inherent to the recording and reproduction of sounds through electro-magnetic influences on a steel wire or ribbon.

Dr. Paulsen, a Danish scientist, thirty years ago conceived this system, and the author, himself, started his investigations some twenty-six years ago.

It is well known that a piece of steel, say a knitting needle or a steel ribbon, becomes magnetized when it is put in contact with a permanent magnet. It is also known that a piece of steel introduced into a selenoid becomes magnetized, and reains so, as long as a magnetic field is maintained by a flow of current in the wire of the selenoid. If we take a long ribbon of steel and with the aid of a spooling device draw it along the pole of an active electro-magnet, the steel ribbon or wire becomes uniformly magnetized. If we alter the magnetism of the electro-magnet while the steel ribbon or wire is drawn along its poles it is evident that this steel ribbon will become unevenly magnetized according to the variation in the strength of the current which alters the degree of magnetism of the electro-magnet. If the changes in the magnetic flow are brought about by speaking into a microphone inserted in the circuit between the battery and the electro-magnet, the current impulses, produced by the microphone will affect the electro-magnet, between the poles of which a variable magnetic field is created, and the steel ribbon or wire will become magnetized in the rhythm of the sound vibrations. The voice will then be magnetically recorded on the steel wire.

This same sound can be reproduced from the wire if a telephone receiver is set in the circuit in the place of the battery and the microphone. The modulated magnetized wire made to run on the poles of the electro-magnet will create induction current impulses which will make the diaphragm of the telephone receiver to vibrate in unison with the impulses produced by the microphone, thus reproducing, in a distortionless manner, the voice recorded upon the wire.

The sound record can be easily obliterated from the ribbon or wire by simply magnetizing the wire evenly throughout its length.

The wire is at first polarized with current values that stand in very distinct proportion to the current intensities of the sound recording to be made afterwards.

The material used, the form and position of the magnet poles, are of extreme importance.

In earlier days, the author used steel cylinders and steel discs, but later decided upon thin steel wire (.25 mm. in diameter), which proved to be satisfactory in every respect. This steel wire is still used by the author in dictating machines and other machines for special purposes. For the recently constructed sound film apparatuses the inventor uses a thin, perforated steel ribbon, which permits the solution of the synchronization problem.

It is of interest to note that this process has permitted to decrease the running speed of the sound record. Paulsen determined the most favorable speed at 3 meters (approximately 11 feet) per second, that is to say, that 3 meters of wire had to pass the recording electro-magnet in one second in order to obtain good recording. By steadily improving the process the author succeeded in reducing this speed to about 1 meter (a little better than 3-1/3 feet) for speech and to 1.2 meters for music. This decrease in speed has considerably increased the efficiency and the noiselessness of the mechanism.

The steel band carrying a record synchronized with picture, is at the present time made to run at a speed of 60% faster than the picture record. It is well to note that since the thickness of the steel band is only 0.05 mm., the size of the film and steel reels are the same.

According to the author, frequencies up to 10,000 per second can be registered on the steel band with the devices now available. This is amply sufficient for the purpose of sound film.

Higher frequencies were recorded in an experimental way.

Comparison of the electro-magnetic system with the process of optical recording of sound on film, reveals the fact that both processes are entirely free from inertia. This leaves to the electro-magnetic system the great advantage of eliminating all the processes which are inherent to the film, such as the developing and printing, which processing cannot be done without influencing the final results.

The modulated sound track of the steel ribbon can, after recording, be immediately reproduced with the same volume and quality that is needed for theatre performances, later on. It is superfluous to mention the advantages that directors, actors and sound engineers are enabled to derive from this extremely desirable feature.

The process of printing is also free from inertia and since it is done without necessitating the laboratory processes inherent to sound recording on film, the copies obtained are of the same quality as the original.

Due to the possibility of recording high frequencies, the tone quality, when reproducing, is of the highest brilliancy and plasticity—the hissing sounds, such as the sound "S," are faithfully reproduced. Whispering being done several feet away from the microphone, as well as the fortissimo of an orchestra, are registered with absolute clarity. The sound characteristics of different instruments, and of the piano, above all, are most perfectly reproduced.

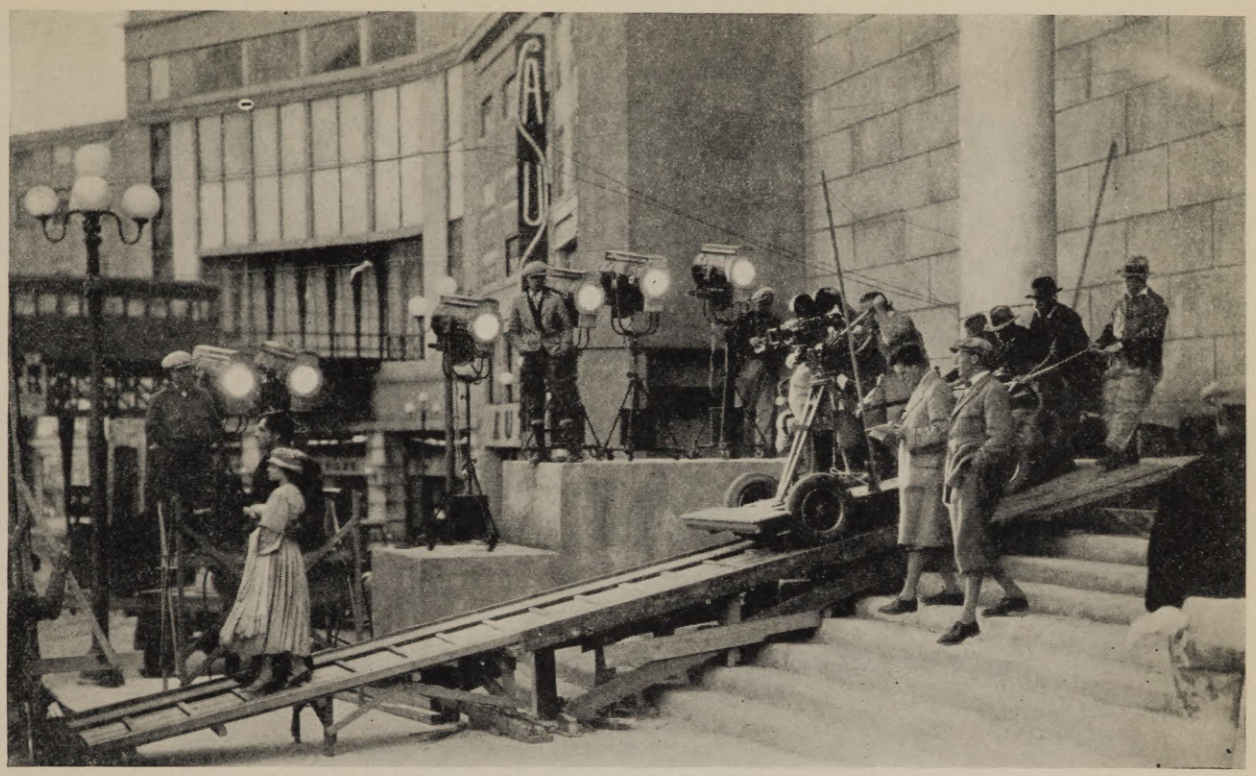
The necessary apparatuses are very simple in construction and, therefore, reasonable in price. The essential parts of the reproducing apparatus consist of two reels on which the steel band is being fed and taken up by a few guide rollers driven by a synchronious motor and by means of a sprocket.

The author stresses great emphasis on the pliability of the system, and mainly points out the easiness of editing sound records, due to the possibility of altering, at will, the volume of the sound reproduction during the printing process, and according to the dramatic or visual exigencies of the edited picture.

After mentioning other special possibilities afforded by the use of the magnetic system, the author concludes by stressing upon the durability of the magnetic sound record. He describes how one of his associates found a thoroughly rusty wire spool in the attic, among other rubbish, and conceived the idea of cleaning it and running it through the reproducing apparatus. The reproduction was as good as that of a record freshly made, although that particular record was recorded in the year 1913.

The author minimizes the effect that a concussion would

(Continued on Page 41)



F. W. Murnau and Karl Struss directing a scene with Janet Gaynor and George O'Brien for "Sunrise," a Wm. Fox production. Brown Ashcraft High Intensity Spotlights boosting daylight

Some Properties of Fixing Baths

(*Continued from Page 4*)

6. *Time during which the films remain in fixing bath.*
7. *Age of fixing bath after mixing and previous to use.*
8. *Rate of agitation of film in the rinse and fixing baths.*
9. *Time of washing.*
10. *Temperature of the various solutions.*

In the above tests a standard developer and emulsion was used throughout, and the time of rinsing, fixing, and washing; the degree of agitation during developing, rinsing, fixing, and washing; and the temperature of all solutions was maintained constant. At the outset, the effect of the alkali retained by the gelatin on the hardening produced by the fixing bath was not considered but in all of the cases studied the quantity of alkali retained by the film was held constant so as not to affect the results.

Later experiments showed that the temperature and age of a fresh fixing bath had some effect on the hardening properties even though the bath had not been used. In the experiments the baths were prepared within at least an hour previous to the tests and maintained at a uniform temperature.

The rate of increase in temperature of the bath in which the melting point tests were made affected the determined melting point; that is, the greater the rate of temperature increase, the higher was the apparent melting point. The degree of agitation during the melting point determination materially affected the results. Mechanical agitation was at first tried but this was found to produce inconsistent results over a series of test strips. It was decided that uniform, vertical, hand agitation was the most desirable the frame being moved up and down twice each minute. It was observed that flashed portions of the test strips melted at the same temperature as the gelatin which contained no silver.

5. *Developer Capacity*

(a) The quantity of MQ_{25} which could be added to a fixing bath before the precipitation of aluminium sulfite occurred was considered as its useful developer life or capacity. Although the addition of a given quantity of developer may not produce a precipitate immediately at normal temperatures, the bath will frequently precipitate a considerable quantity of aluminium sulfite after standing for a period of several days. The developer life tests were made by placing samples of the fixing bath containing varying quantities of developer in a hot room at 110° to 115° F. and noticing the quantity of developer required to cause precipitation of aluminium sulfite. For practical purposes the developer capacity was recorded at both 70° F. and 110° F.

(b) In order to test the effect of the addition of developer as carried over by films or prints on the hardening properties of a fixing bath, varying quantities of MQ_{25} were added to the fixing bath and hardening tests made on these samples as outlined previously.

All of the properties of a fixing bath, other than the rate of fixation, are so closely related to one another that it is impossible to discuss one without considering its correlated influence on the other properties of the bath, and for this reason the experiments on the various properties of the fixing bath as outlined above will be discussed under the one heading of "Hardening Action."

IV. The Time of Fixation of Hypo Baths

The chemistry of the processes of the dissolving of silver halides by sodium thiosulfate (hypo) is generally considered to be as follows: The silver halides are probably dissolved in three steps, namely (1) a white insoluble silver thiosulfate is first formed which is further acted upon by the hypo with the formation of (2); a colorless and soluble silver mono-sodium thiosulfate and this reacts again with the hypo forming (3), a water soluble silver di-sodium thiosulfate. The following equations represent the probable chemical reactions involved in the case of silver bromide:

(1) $2\,AgBr + Na_2S_2O_3 = 2\,NaBr + Ag_2S_2O_3$
Silver thiosulfate

(2) $Ag_2S_2O_3 + Na_2S_2O_3 = Ag_2S_2O_3.\ Na_2S_2O_3$
Silver mono-sodium thiosulfate

(3) $Ag_2S_2O_3.\ Na_2S_2O_3 + Na_2S_2O_3 = Ag_2S_2O_3.\ Na_2S_2O_3$
Silver di-sodium thiosulfate

In recent years it has been questioned whether a film which is just cleared is completely fixed or whether the film should be allowed to remain in the fixing bath for double the time required to clear. Experiments by Bullock,[8] and Lumière and Seyewetz[9]. indicate that a just cleared film is completely fixed and experiments by the authors have confirmed this observation.

The time required for fixation of any emulsion depends on several factors as follows:

(1) The nature and thickness of the emulsion.

(*Continued on Page 38*)

Smith & Aller Provide Experimental Stage for Cameramen

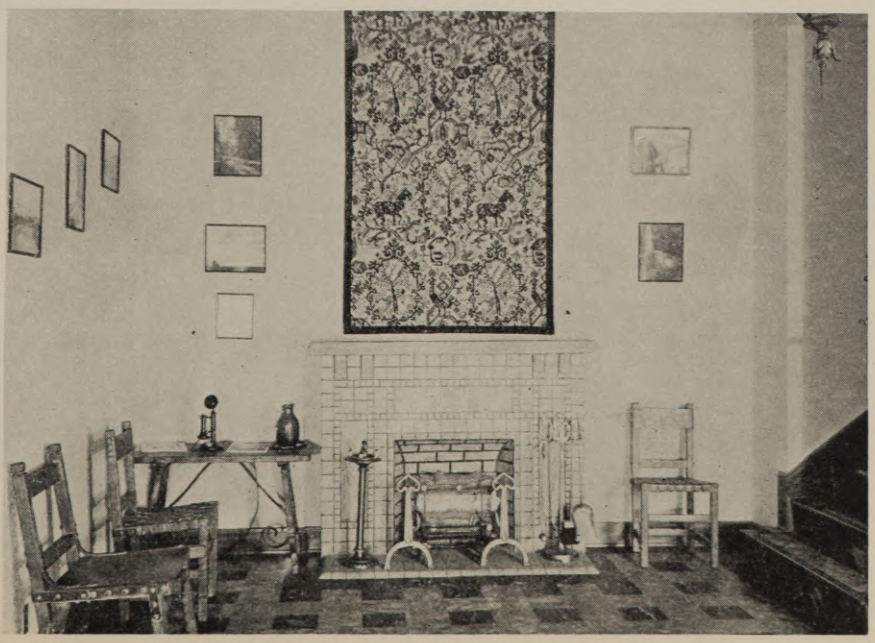
Experimental set for cameramen at Smith & Aller's Hollywood building. It is fully equipped with every modern appliance.

RECOGNIZING the need for an experimental stage where cameramen may work out their ideas during their spare time, the firm of Smith and Aller, Pacific Coast distributors of Dupont film, last month completed work on such a stage and now announce that it is at the disposal of the cameramen of the industry to be used gratis at any time the cinematographer wishes.

After long and careful deliberation, this enterprising firm, which had been looking over the field to see where they might be of greatest service to the cameramen, decided to convert one section of their beautiful new plant at 6656 Santa Monica Boulevard, Hollywood, into such an experimental stage.

An interior set 20 by 12 feet was built, with keen observance of acoustic conditions conducive to the making of sound pictures. It has been colorfully and attractively furnished so that it is admirable for either black and white or color photography.

The very latest in incandescent lights have been procured, and provisions of space have been made for back-lighting. Adequate space is provided for lamps above the set and a complete lighting equipment has been installed. Special ventilators have been constructed above the set to provide sufficient air and add to the coolness and comfort.



Reception Room at Smith & Aller Building

The room in which this set has been built is long enough so a shot of sixty feet may be made. A charmingly furnished dressing room has been provided; and, in short, it is the last word in an experimental set for the use of the cameramen.

"We have provided this set for the use of the cameramen," declared Mr. Smith, "because we have felt for a long time that the cameramen needed and would find much use for such a set.

"Now, we hope the cinematographers will make themselves at home here and use the set as though it were their own," added Mr. Aller, "If there

(Cont'd on P. 43)

New Arc Lamp Introduced By Otto K. Olesen Company

One of the most important announcements in the motion picture lighting field during the past month comes from the Otto K. Olesen Illuminating Company of Hollywood.

This organization has been quietly at work on the new lamp in conjunction with the engineering department of the National Carbon Company and now offers the studios a side arc lamp which the Olesen firm declares gives fifty per cent more light than any other lamp on the market.

The outstanding features of this new "OKO" arc lamp are the reflectors. These, according to R. E. Nauman, chief of the electrical engineering department of the Olesen firm, are made of a specially constructed chromium-plated copper. It is on the material used in the reflectors that the Olesen firm and the National Carbon Company engineers have been working for some time, according to Nauman.

"This new side arc lamp," says Nauman, "is the last word in lights. It is correctly designed for proper angles of dispersion and gives an increased reflector overall efficiency that is almost unbelievable. This lamp, with the new type reflectors, gives fifty per cent more light than any lamp of its size on the market, and will be a revelation to the studio technicians.

"We have been quietly working with the National Carbon Company on this new studio lamp and are confident that we have produced a product that will soon be found on every set."

Incidentally, Nauman predicts a rapid return to the universal use of arcs in the making of talking pictures.

"The idea that arcs couldn't be used in making talkies is being rapidly discarded," says Nauman. "There is hardly a studio in Hollywood now in which you do not find arcs in use. They are the only lights for sharpness of definition and experience is proving them decidedly practical for talkies."

Oakland Firm Wants Scenes Depicting Life and Customs Abroad

AN UNUSUAL opportunity is now offered to studios and cameramen to dispose of negatives photographed in foreign countries.

After a careful investigation of the educational field, Veritas Films, of 829 Harrison Street, Oakland, California, has embarked in the field of supplying 16 mm. films showing life and customs in foreign lands. This firm wishes to provide for the schools and other purchasers of its product pictures which are untainted by propaganda. They want nothing but the best authentic shots that show the foreign countries as they really are—not as the publicity propagandists of the countries wish them to be portrayed. In other words, this firm is providing truthful pictures to teach the youth of our nation how people in other countries work and live and play.

Already they have brought out such 16 mm. releases as "Reindeer Herds of the Arctic," "Dwellers of the Northland," showing natives in their homes in Alaska and northwestern Siberia; "Valley of 10,000 Smokes," a photographic study of this little known region; "The Life of the Salmon," "Work Dogs of the North," "Fur Farming in Alaska," etc.

They want to purchase foreign negative from studios or cameramen who have such on hand or stored in their vaults. A cash or royalty basis is offered. The company wants all the interesting foreign negatives it can get, and will reduce the 35 mm. to 16 mm. for release prints. Additional information may be obtained by writing Veritas Films direct, or by writing the Editor of the American Cinematographer.

Borax Developer

(*Continued from Page 5*)

Other workers have shown that high sulfite concentration tends to produce fine grained images. From a practical point of view a developer which gives a satisfactory fine grain with maximum effective emulsion speed is to be desired. A sulfite concentration of 75 grams per liter was found to give satisfactorily grain free images, and at the same time to give a high effective emulsion speed.

Borax

The borax appears to influence the development only through its effect on the alkalinity of the solution and hence its effect can be completely presented only in conjunction with other factors affecting the alkalinity of the developer. For the simple case, varying borax only, Fig. 3 shows the effect on the development for the 8 minute period chosen. Increasing the borax increases the alkalinity (represented by increasing pH) with a resultant increase in the activity of the developer. With the quantity of metol used in this series, there is little difference between development with 5 and 10 gm/l. of borax.

Reducers

In the first series of tests with its low borax concentration it soon became evident that the hydroquinone did little of the development. When the basic formula indicated for this series was mixed with the omission of metol, 16 minutes agitated development gave a barely perceptible density at the longest exposure given the test strip. Needless to say, such development is worthless. Mixing again, this time including the metol but omitting the hydroquinone produced a fairly satisfactory developer; one which produced densities which differed but very slightly from those produced by the complete formula.

In the case of the second series a similar test was made, the results of which are presented in Fig. 4. Here the borax concentration is higher than in the previous case and the hydroquinone alone does develop noticeably, but still not enough to make a worth while developer by itself. Metol alone is very satisfactory and the densities differ but little from those produced with an additional 5 or 10 gm. hydroquinone. The tests showed a tendency for fog to increase more than in proportion to the additional development produced by the increase of hydroquinone. The net result was that cleaner more satisfactory development was obtained by increasing the time some twenty percent with metol only as a reducer. The degree of increase of fog with hydroquinone differed somewhat between different emulsions, and in many cases was serious.

With metol alone as a reducer, the image density for fixed time of development does not increase indefinitely. Fig. 5 shows a series of curves with increasing metol concentration. It is to be noted that the alkalinity of the developer, pH, decreases due to the addition of the metol, which is sold commercially as a sulfate and hydrolyzes liberating acid in the developer, making the solution less alkaline. The activity is thus so reduced that 10 g/l. of metol gives less development than 5 g/l. The increased concentration can be made more effective by progressively increasing the borax content as the metol is added, if that increased activity is desired. A balance of 5 g/l. borax and 2.5 g/l. metol together with 75 g/l. of sulfite gives a developer which very closely approximates the development rate of other borax formulas in use, and at the same time makes economical use of the expensive reducing agent.

Potassium Bromide

The fog produced by this developer is sufficiently low so that no bromide is needed as a restrainer. The retarding effect of bromide is shown in Fig. 6. Even with small quantities there is a marked loss of effective emulsion speed.

The accumulation of bromide and other developer reaction products does not rapidly impair the development characteristics. Fig. 7 shows the results of an exhaustion test with this developer. It will be noted that after 400 ft. per gallon had been developed, 12 min. in the old developer and 8 min. in the fresh developer produced a density of approximately 1 for equal exposures. This longer development, however, gives pictures with slightly less shadow detail than the shorter development time gives in fresh developer. The alkalinity of the developer under observation remained practically constant, showing that the necessary increase in developing time comes as a result of the reduction of concentration of reducer and the accumulation of bromide and reaction products in the developer rather than to alkalinity decrease. The practice of renewing a borax developing bath with additions of borax serves to bring the rate of development back to the original figure but can not bring the detail giving power which has been lost through the progressive bromide accumulations. The permissible tolerance will vary somewhat with the class of work, and will determine the "life" of the developer.

1. C. E. K. Mees & C. W. Piper; Phot. Jour. Lii p. 225, 1912.

Du Pont-Pathe Perfects New Tinted Positive Film

A new type of positive motion picture film has recently been perfected by the Du Pont-Pathe Film Manufacturing Corporation which combines a clear sound track with a tinted picture area on one piece of film, according to an announcement by this company.

"This feat in manufacturing technique," says the announcement, "has removed one of the great disadvantages inherent in sound-on-film processes and makes possible once again the use of tinted stocks; an artifice which has long been employed for emphasizing dramatic effects and for giving the proper settings for a wide variety of out-of-door scenes.

"Up to the present time it has been necessary to print all sound-on-film pictures on black and white stock. This was because the commonly used tints removed such a large proportion of the rays to which photoelectric cells were sensitive that light which passed was inadequate to properly actuate the cell.

"Attempts have been made to get around this difficulty by film manufacturers through choosing tints which transmit the active rays but are of limited interest because it happens that many tints which were popular and widely used in silent pictures and which the public has learned to associate with definite dramatic moods can not be duplicated by tints which conform with the standards imposed by the photoelectric cells.

"The new type Du Pont stock frees the presentation of high class talking picture production from a serious limitation (placed upon them by the advent of sound) and should prove a decided factor in the advancement of the art."

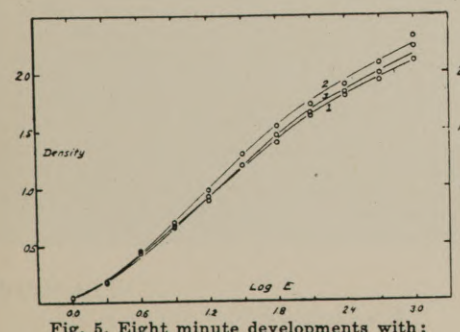


Fig. 5. Eight minute developments with: Sodium sulfite, 75 g/l; metol, varied; borax 5 g/l. Emul. 2568.

Curve No.	Metol	pH	Fog
1	2.5	9.0	.07
2	5	8.6	.05
3	10	8.2	.07

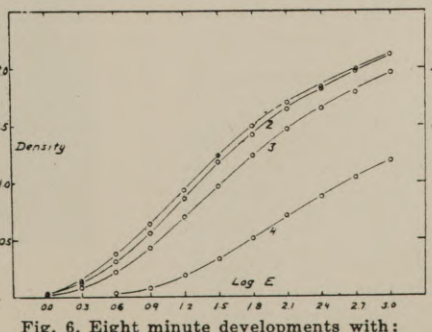


Fig. 6. Eight minute developments with: Sodium sulfite, 75 g/l; metol 2.5 g/l; borax, 5 g/l; potassium bromide, varied. Emulsion 1612.

Curve No.	Bromide	Fog
1	0	.15
2	0.1	.12
3	0.5	.08
4	2.5	.04

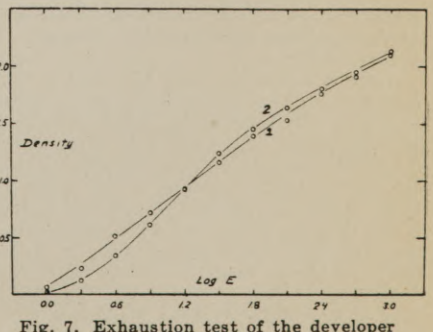
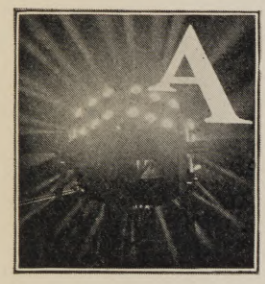


Fig. 7. Exhaustion test of the developer recommended.

Curve No.	Feet per Gal.	Time of Development of Test Strips
1	0	8 min.
2	400	12 min.

ASCOT RACE TRACK LIGHTI



AUTOMOBILE racing at night in the past was for a long time a question somewhat similar to that of Television today: practical, but to what extent no one was able to say.

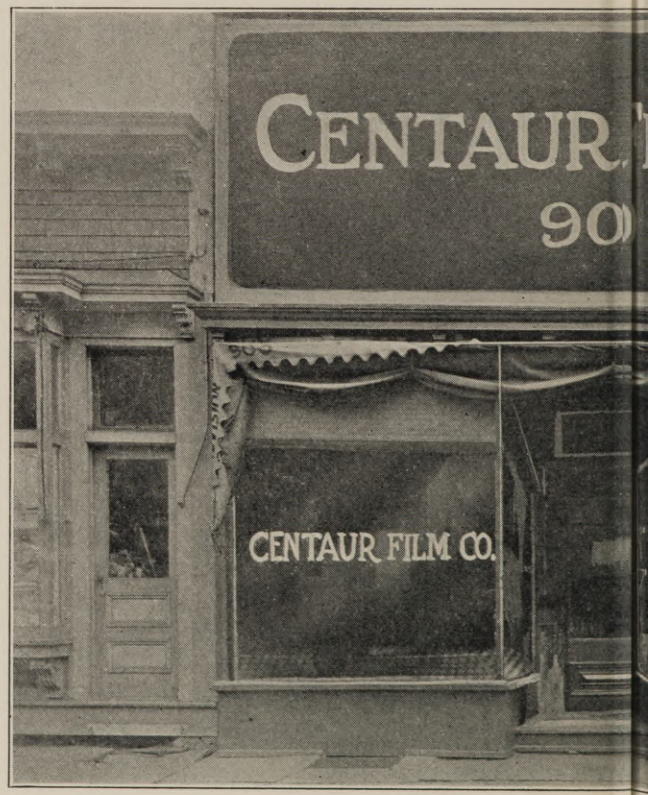
With Television, the extent of practicability remains a question; something that the future will reveal. However, the problem of night automobile racing has been solved, proven and accepted by no less an authority than the A. A. A. (American Automobile Association). And this acceptance was not given until the solution had passed he rigid scrutiny of A. C. Pillsbury, Director of Operations for California, Arizona and New Mexico. And in addition to Mr. Pillsbury, Fred J. Wagner, noted official starter, passed on the solution which in the last analysis, is lighting.

With that same spirit that has made The American Legion famous, the Glendale Post, No. 127, decided to inaugurate night racing, knowing that others had tried many times, but had failed to accomplish the extremely difficult task, of not only lighting the track, but getting the A. A. A. to accept and approve it.

All preliminaries had been arranged for holding the races at the Ascot Speedway up to the point of lighting the track. But who could do it was the question. It was to involve the expenditure of a large sum of money and looked like playing a "long shot." Who had a reputation in this field that was an absolute undisputed authority and could accomplish it under such drastic requirements? After a prolonged study of the field of lighting engineers, the committee made a visit to the Coliseum at the time of the Shrine Convention and were finally convinced after conferring with the various committees that the only one capable of guaranteeing results on as large a scale as this, was Otto K. Olesen Illuminating Company, 1560 Vine Street, Hollywood, Calif.

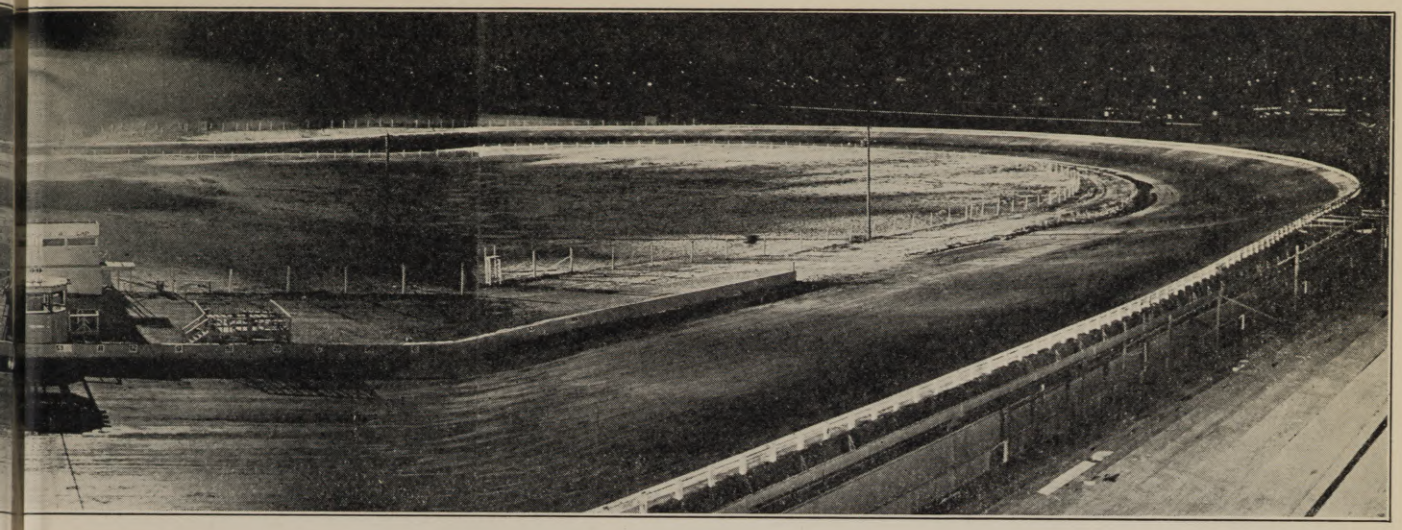
After a conference with Mr. Olesen, the contract was let. Speculation was rife among the drivers as to whether the outcome would be a success. The outstanding requirement in the engineering of the project was safety. The track is ⅝ of a mile in diameter, 60% of which is curved, and as the average qualification time is 30 seconds per lap, the cars would be traveling at 1¼ miles per minute or 75 miles per hour, which in turn is 110 feet per second. At that speed, a failure of the lighting system would be disastrous, to say the least. An even flood of light was required with no glare to the drivers. That is, lights could not be placed at any point that would cause the drivers to look into them while racing. The shadow of the car was the next issue. At no time could the shadow be in front of the car. It was to be located in such a way that it would not bother the driver; that is so he could not see it and think it was another car. This in itself was no small problem. How the lighting was worked out is best described by R. E. Nauman, chief Electrical Engineer of the Olesen Company.

"We will start with the first issue, 'Safety'," says Mr. Nauman. "Service was contracted for with two separate Power Companies for the full amount of the load, 80 Kilowatts. The load was then divided through the medium of double throw switches—half of it on Power Company 'A' and the other half of it on Power Company 'B.'



The Cradle of

IN THIS BUILDING at 900 Broadway, Bayonne, New [illegible] David Horsley started making motion pictures in 19[illegible] the Motion Picture Patents Company was formed in 190[illegible] join except the Centaur Company. The excuse for barring [illegible] This then became the birthplace of the independent motion [illegible] as Mr. Horsley says, "became so big it killed the trust wa[illegible]



FOR NIGHT AUTO RACING

"The load consisting of forty 18-inch projectors equipped with parabolic mirrors and using 2000-watt G 48-115 volt lamps, twenty of these lamps were on one line and twenty on the other.

"The placing of the beams on the track was next. First a lamp on Power Company A was set. Then another from Power Company B, and so on alternately, so that in the event of failure of either Company, the entire track was lighted with light and dark intervals of equal distance, approximately 83 feet each. This leaves the driver in this dark area about seven-tenths of a second, but with a lighted area ahead of him as a guide. If a thing of this nature should occur it would last less than a second, as the switch for that half of the load would immediately be thrown over to the other Power Company. On test this has been accomplished in an interval too short for the eye to detect. Observers have not been able to tell that the load was changed from one Company to another.

"The second issue was easily met by an even overlapping of the beams.

"The third, of controlling the shadow as well as glare, was overcome by placing the light source in the geometrical center of the track. As the turns are made to the left this places the shadow on the right, and, of course, keeps it there. Now came the problem of making the shadow very short or close to the car so that it would not interfere with a driver that was passing. This meant to place the lights very high in the air. This was done by the isue of seven, seventy-foot poles, set seven feet in the ground and placed in a ten-foot radius, making a twenty-foot circle, with one pole in the center. A platform was then built on the top with the center pole acting as a ladder to the top. A railing was then provided and equipped to accommodate twenty of the lamps and the other twenty operated from the floor of the structure. A hoist was built to raise and lower the gate, etc. All switching appurtenances, transformers, and meters are on the ground level.

"Of all the favorable comments made by the various drivers, this remark was best, when asked how he liked the lighting he replied. 'It's better than daylight.' Of course, I was curious and pursued my question farther by asking how he arrived at that conclusion, and the answer was as follows:

" 'Well if it was a day race, it would be in the afternoon and the sun would be low in the sky. This would mean that at one place in the track you would be driving into the glare, which puts the shadow of your car back of you and also puts back light on the dust and makes it hard to see through. On the opposite side the shadow will be in front of the car and the dust will be front lighted; while on either end the shadow will be first on one side and then on the other with the dust cross-lighted, an ever changing condition with nothing constant, along with the fact that at night everything is dark but the track and nothing distracts from your driving' All in all a pretty good analysis.

"Since the installation of this lighting system automobile racing at night at the Ascot track has become one of the popular sports of Southern California and officials from tracks in various sections of the country are turning their eyes toward California for the solution of their lighting problems."

cture Liberty

, 22 feet wide, 52 feet long, on a lot 100x25 feet, nder the firm name of Centaur Film Company. When ry single company in the United States was allowed to irm was that "They only had a wash tub and a sink." ure industry of the United States, and "in five years," ried to strangle it in the place where it was born."

HEINZ SPECIAL DEVICES

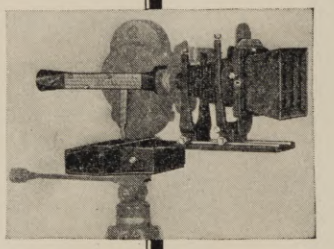
The DAWN of a NEW DAY in 16 MM PHOTOGRAPHY

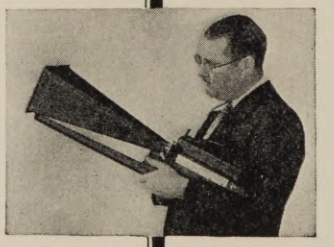
Adding that "*Professional Touch*" to *Amateur Pictures*

1 The HEINZ Micro-Focus-Meter attaching to any 16 mm Camera with focusing mount lense will instantly give you accurate focus and correct exposure, showing the exact field you are to photograph, right side up and magnified 15 times. An additional magnification to 22 times natural size is provided for exceptionally exact work. Try it and note the tremendous improvement in every picture you take.

2 The HEINZ Matte Box with the Micro-Focus-Meter adds all the necessary equipment to duplicate the most intricate and interesting professional trick effects. It is adjustable in all directions, fits all lenses, is equipped with 3 filter holders, an opening for black or white manual dissolve, gauze holder and eccentric iris opening on any spot in field or aperture and frame dividers for multiple exposure.

3 The HEINZ Title Hood, simple, prealigned, instantly attachable to any camera with a focusing lense permits you to shoot your TITLES as you shoot your picture. Just write, type or print your titles on our special patterned or clear transparencies, place in the hood, attach to your camera, point at a light, set correct exposure and press the button. As simple as that.





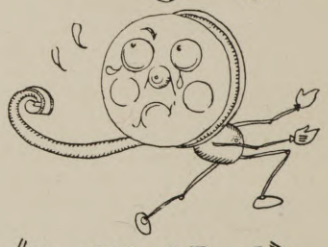
Top — Micro-Focus Meter on Bell & Howell Filmo 70.

Center — Matte Box and Micro-Focus-Meter on Victor camera.

Bottom — The Title Hood on Eastman Cine Kodak.

"Amateur Fuzz"

"Bad Lighting"



"Untitled Reels"

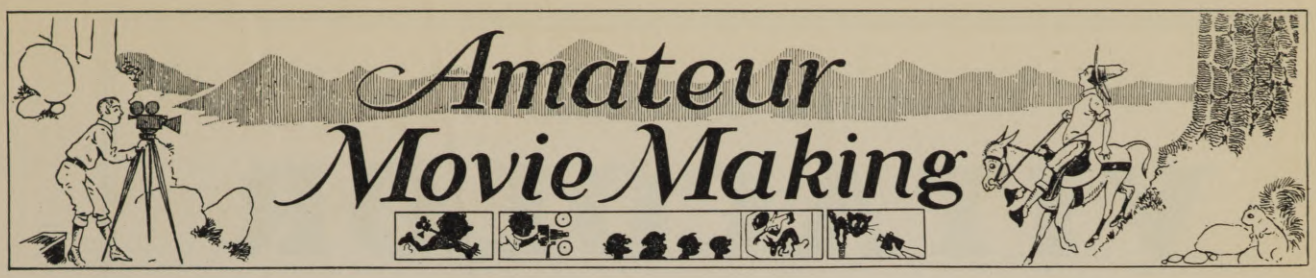
Ask for a Demonstration

of these 3 new Heinz devices at your dealer's. If not yet on his floor, write direct to factory for detailed information.

Movie Specialty Manufacturing Co.

1361 So. Flower St., Los Angeles, Calif.

Micro-Focus-Meter, $40 ◆ ◆ *Matte Box with Micro-Focus-Meter, $99.50* ◆ ◆ *Title Hood, $23.75*



By WM. STULL, *A. S. C.*

AFTER the average amateur has filmed the antics of the entire family a few times over he finds the problem of what to shoot next looming larger and larger on his horizon. After all, Baby's first step can only be filmed once, and Uncle Charley's famous "Dance of the Seven Veils" can hardly be repeated with its original success. The pictures taken at the beach were a lot of fun —but after the second picnic is filmed, and found to be merely a repetition of the first, both reels are usually laid aside and forgotten, like last year's snapshots. At this stage, the camera is very likely to follow them unless the user finds within himself the key to renewed interest in his hobby. If he finds it, though, there open to him endless new vistas of enjoyment, recreation and knowledge.

And yet this key is no magic talisman, but merely the application of common-sense to cinematography. If random cinematic snapshooting fails to bring lasting satisfaction, it is only logical to expect that perhaps deliberate, planned filming might succeed. If purposeless films don't please, films made with a definite purpose should, shouldn't they? And they usually do. In the first place, if they have been carefully planned, they have generally been well enough thought out beforehand to eliminate most non-essential and uninteresting details in advance. In the second place, if they have been made with some definite underlying purpose, they usually bring to the screen enough of that purpose to arouse and hold audience-interest even after many showings. Incidentally, their conception and realization is splendid mental (and physical) exercise, as well.

The Dramatic Subject

Of course, the first subject that comes to mind for such premeditated filming is the dramatic film. It offers a vast and fascinating field of endeavor, but it is usually far beyond the scope of the individual worker. Where there is a group interested in such production, there is nothing more interesting—nor more exacting; but for the individual, it is generally entirely out of the question.

There are countless other subjects which offer the individual as extensive fields as his ability can grasp. His hobbies, his travels, his work, even his daily surroundings, can all be made into pictures of most surprising interest. There are, for instance, innumerable surgeons who find the cine camera invaluable to their work, and an interesting diversion, as well. Here in Hollywood, one renowned surgeon has a library of several hundred reels of his own operations, and finds the making and reviewing of them a most instructive practice. There are here, too, a number of cine amateurs who have found both pleasure and profit in cine-micography, while many archaeologists and geologists carry filmos on their field trips as a vital part of their equipment.

Golfers, Attention!

Not all of us, however, are so scientifically-minded that we can enjoy filming and viewing appendectomies, spirozoa, or Pleistocene deposits. Fortunately, such things do not entirely exhaust the range of possible subjects for advanced filming. Far from it! There is hardly a phase of normal modern life which has not the germ of a screen subject latent somewhere within it. For instance, four out of every five adults are either golfers, or golf-widows; and what a series of interesting reels cannot be built up around that ancient and honorable game! Imagine the endless possibilities of normal-speed, slow-motion and natural-color reels merely of one's own game. Then similar studies of the play of champions, supplemented by the reels commercially obtainable of the same subjects. And this holds good for tennis, baseball, cricket, football and all the sports. Racing? What endless and spectacular opportunities the followers of the turf have! And as for the rapidly-growing air clan—what can't they do? Imagine the thrilling interest of making and owning a series of reels showing the rudiments of flying—the outstanding types of planes at rest and in action—of scenes from aloft on one's own flights—and of famous flyers and their machines. How interesting and valuable we'd find such films of the pioneer flyers and their amazing little machines—and today's men and machines will be just as interesting tomorrow. But aircraft alone need not be the sole subjects of such collections. There are photographers who have for years specialized in building up collections of still pictures of locomotives, of motor-cars, of ships, and even of bridges. Now imagine the interest of making such a series in motion—perhaps also in color!

Then, consider all of the interesting things that can be filmed during even a short vacation. Aside from the beaten paths of vacation films there are innumerable possibilities. In fact, the little, ordinarily-overlooked subjects are often more interesting than the more obvious ones. Short reels, for example, on wild life, flowers, clouds, and so on, can be made objects of lasting interest. A few years ago, for instance, the writer, while on a vacation trip in Southern Oregon, found enough material between times to make a fascinating little reel merely on rivers! Another time, a vacation on an Eastern farm resulted in several reels showing in detail the various operations of farm life—planting, cultivating, harvesting of crops, stock-raising, and so on.

Fields Are Varied

But there are vast fields of interest quite aside from these more or less mechanical films. Wherever we are, whatever we do, can in some way be conceived as an interesting subject. Visit an exhibition of paintings or a salon of pictorial photography. What diverse subjects have been turned into beautiful pictures by the magic of the artist's brush or lens! Little things we ordinarily pass by unnoticed, yet having within them, latently, the seeds of beauty and interest. I recall at a recent salon a most striking print which showed merely the rear axle and wheels of some forgotten Ford, half submerged in the oily water of a squalid ditch—yet the photographer's eye had seen the spark of interest in it, and had made of it a most original and decorative picture.

We need not deliberately seek the junk yards in search of such objects of potential interest and beauty. Every day there pass by us scores of little scenes which could be made lasting pictures of beauty and interest, did we but see and record them.

Years ago there lived in Paris a man who saw these things, and longed passionately to perpetuate them. Yet he could neither draw nor paint, so he turned to the then-despised camera as the sole remaining method of expressing his artistic yearnings. With it, he found his mètier, his recreation, and his life-work. Today, the records which he so painstakingly made are priceless, for, aside from having served as inspiration for innumerable great paintings, Eugene Atget's 10,000 photographs of the Parisian life of his day are recognized as artistic achievements on their own merits.

He did not merely photograph the obvious; had he done so, both he and his work would long since have been forgotten. Instead, he sought and recorded those thousand-and-one little moments of Parisian life of the '90s

which were so much a part of the city's life that they were generally completely ignored. Shop windows—full of wasp-wasted corsets, or amazing shoes; the street-vendors passing the time of day with the pushcart man; organ-grinders; sellers of chestnuts and ices; horse-cars; omnibuses; shady courtyards; shadow-splashed walls; inviting gateways—all of the myriad tiny details that formed his Paris. Every one of them technically perfect: vibrant with motion, though perforce time-exposures; and composed and lighted in a way worthy of the best of present-day camera-masters. In all, a wonderful collection. Imagine what it would be like, granted the boon of living movement! And yet, there are equal opportunities offered us all, today, wherever we live, if we will but see, and act.

Whether we live in Oslo or Omaha, Cambodia or California, the opportunities are there if we will but see. And if we do see, and build upon a firm foundation of technical excellence a structure of cinematic beauty, there is no limit to the joy and interest held by our hobby; no need to fear it will ever lose its tang, for as we work, strive for better technique and increased appreciation of the beautiful, its horizon will always advance before us, as we go our way through its endless, fruitful fields.

S. M. P. E. Fall Meeting Slated for Toronto

THE annual Fall meeting of the Society of Motion Picture Engineers is scheduled to be held at Toronto, Canada, according to announcement by President L. C. Porter. The meeting will start October 7 and end October 10, according to present plans.

Canadian and other members of the S. M. P. E. have been making an insistent demand for the convention, as none have been held there since October, 1923, when Ottawa was the fortunate city.

Attendance at the Spring meeting in New York last May was the greatest ever; but officials of the society declare that they expect the Toronto meeting will break all previous attendance records. Officials of the society report a tremendously increased interest and activity during the months since last May, and announce a greatly increased membership.

Los Angeles Firm Provides Club and Projection Rooms for Amateurs

VERY often the enjoyment of a perfect vacation is seriously marred by the fact that home and its facilities for editing and projecting one's films must necessarily be left behind. This is particularly true when one can find no place to show vacation films to the friends that appear in them, or else must show them in their worst condition—unedited and incoherent.

In Los Angeles, however, such misfortunes are no longer necessary, for one of the city's oldest and best-known photographic houses has recently announced the provision of a large and comfortable clubroom to serve as a cinematographic home for visiting and local cinematographers. The B. B. Nichols Company, extending their familiar policy of friendly service to the amateur, are remodeling the quarters directly above their store at 731 South Hope Street, and have thus far provided a large and pleasant projection room, completely equipped with all systems of both black-and-white and color projection, which they invite amateurs to make use of. Plans are also under way for the provision of smaller, private rooms in which the amateur may edit and project his 'rushes' undisturbed.

The personnel of the Nichols' cine department, headed by Mr. H. W. Devereaux, is at all times ready to help the amateur on any point that may arise. As Mr. Devereaux is a veteran of long experience in both studio and amateur cinematography, and keenly interested in the amateur and his problems, the value of this service is apparent.

In addition to this, the firm maintains one of the largest and most complete precision cinemachine-shops on the Pacific Coast. presided over by an expert cinema engineer. Here every imaginable repair and alteration can be made without the delay and expense of sending the camera or projector to an Eastern factory, and with a precision and accuracy rarely achieved even in the factories themselves. If a thing can be done at all, it can be done in this shop, where the watchwords are precision in workmanship, and reasonableness in prices.

These changes are parts of a general program of expansion now being instituted in the Nichols Cine Department, whereby they hope to extend their established policy of quality merchandise and friendly service to make it available to a larger number of cine amateurs than ever, and more helpful.

INFORMATION FOR AMATEURS

Amateurs—Send your problems to this department and have them solved by the world's finest cinematographers—the members of the A. S. C. This is your department. Our aim is SERVICE. Write us and find your answers here.

Question from L.D., Davenport, Iowa: Can thin, overexposed 16mm. reversal films be intensified?

Ans.: We believe so; these films can be dye-toned the same as ordinary prints, so they should be able to be intensified, too. However, the light and heat of the projection-lamp might have some effect on the intensified image, so we recommend that you keep the film in the dark as much as possible. Incidentally, dye-toning might serve to build up the density of the image, too.

Question from R.S., Macon, Ga.: I want to try some of the back-lighting effects I see in professional films, but the instruction-books say never to make a picture except where the light comes over your shoulder. Is there any special device the studio cameramen use to get these effects?

Ans.: You can get the effects you want with any amateur camera if it is equipped with a lens-hood, or sunshade, and care is taken that the direct rays of the sun do not strike the actual lens surface. In back-lit shots, the light should come from behind, and to the side of the subject, and the best results are gotten when the sun is fairly high in the sky. Of course, you should use some sort of reflector to illuminate the shadowed side, so the detail there won't be lost.

Question from M.T.R., Pittsburgh: I am planning a foreign trip. Should I carry a supply of film with me, or can I get it as I travel?

Ans.: It largely depends where you are going. Eastman, Agfa, and the other firms have branches in most of the chief cities of the world where supplies are available. However, if you are going to the tropics, or for long sea-voyages, we recommend that you get your film from the manufacturers, in the specially sealed tins provided to exclude dampness in such conditions. They will also gladly furnish you with a list of their branches and processing-stations if you wish it.

Question from R.H., Omaha: What is the reversing solution used for the Agfa reversal film?

Ans.: Potassium bichromate, 5 grams in 1000cc. of water, sulphuric acid 10 cm. The last should be added slowly and cautiously, as heat is generated. The negative should be well rinsed before reversal, otherwise the developer alkalies weaken the reversal bath.

"Bub" North Screen

A new, improved "Bub" North Screen is now on the market for both Kodacolor and black and white picture projection. The rigid type of frame is used, and the fine textured projection surface will always be perfectly flat, as its base is 14-gauge aluminum, which, of course, will not warp nor wrinkle. The new screens are mounted upon a separate inner frame which may be lifted out and placed face inward within the outer frame. This protects the projection surface.

Story of Spark Plug Filmed

In this day and age of the automobile and airplane a spark plug, while one of the most important factors in our lives, is such a common article that we scarcely give it a thought, except when we need a new one.

However, the U. S. Bureau of Mines, Department of Commerce, has taken the spark plug and has produced a film showing the making of this little article that is attracting much attention. It is called "Along the Firing Line, or the Story of the Spark Plug." Great pains were taken in the filming of this picture which shows every possible angle of the work that is done to make the plug. Real thought and artistry have been shown and instead of being a tiresome subject it has been made into a picture that is pleasing to the eye, entertaining and very instructive.

Question from T.S., New York: Is there any motion-picture camera made with a focal-plane shutter?

Ans.: Yes, the Akeley has such a shutter, in the form of a cloth curtain which revolves completely around the inside of the case, passing directly in front of the film. It permits the absolute maximum of exposure. The reason this form of shutter is not used in amateur cameras is lack of space. However, the revolving shutter used is nearly as efficient, as it is behind the lens, and very close to the film.

Question from M.R.S., Portland: How can I make my backgrounds in close-ups diffused?

Ans.: Simply bring your subject away from the background several feet. Then when you focus on the subject, the background will be diffused.

Question from R.B., Los Angeles: What type of reflector would you suggest for back-lighting a woman's hair for close-ups?

Ans.: This depends on the hair. For example, an ordinary mirror is the best reflector to use in cases where the subject has brilliant, fiery red hair; also for a very golden blonde. But a softer reflector should be used for a distinct brunette. I would suggest, as a home-made affair, that you use a reflector painted with dull white or a dull silver paint. For a chestnut brown head of hair or an ordinary blonde, use a reflector of glossy finish or one covered with tin foil.

And, while on the subject, let me add that wise use of reflectors will be a distinct aid to securing better pictures. Reflectors are easily made. Just use a square of light wood, size according to what you want—I'd suggest three feet high by two and one-half feet wide. For soft reflector paint it with dull white. For hard reflector, paint it with glossy white enamel or cover with tin foil. These are a remarkable aid to good photography as they soften shadows and prevent pronounced contrasts.

PREPARING PROJECTION PROGRAMS

Your Friends May be Getting a Free Show, But They Should be Considered, Nevertheless, or Your Showmanship Prestige May Suffer

By SYRIL DUSENBERRY

THE preparation of a suitable program for the home movie show is a phase of movie making that has been sadly neglected. Many amateur workers handle their camera with great skill but when it comes to arranging an interesting program for the entertainment of the home movie audience they are hopelessly lost. Too many movie makers delight in inflicting their pet films on their patient audience without regard to whether they may be interesting to them or not.

Our first consideration is the length of the average home show. Ordinarily it should run between an hour and an hour and a half. This means about five or six four-hundred-foot reels of 16 mm. film. An excellent show can be made up of four such reels and it is recommended that the program run not over this amount unless a feature picture itself is five reels, in which event another short subject reel can be included to round out the program. Unless the pictures have unusual merit or are of special interest it is too much to ask the average audience to sit through programs of greater length at a home movie show.

We are now ready to delve into the depths of selecting suitable subjects. In order to guide the movie maker in the preparation of an appropriate program, the table accompanying this discussion has been prepared with great care. At first glance, some of the suggestions may appear quite obvious and self-evident, but experience has shown that many of these often slip the mind at the crucial moment. While this table was compiled for use by movie makers using 16 mm. film and having a rental library at their disposal, it can be readily adapted to those using standard film.

Let us examine the table of suggested subjects for a moment. Children, as a rule, enjoy several short pictures rather than a single long one, hence nothing in the juvenile class is longer than two reels. The mind of a child is taxed when it is asked to follow a long and, perhaps, complicated story. Adults, on the other hand, seldom care for a hodge-podge of subjects, but prefer one good feature. Young people of the collegiate type want pictures that move forward with a snap and strongly object to slow moving scenics and preachy stories with a moral. When the interests of a particular audience are definitely known, these should be catered to diplomatically without making it appear that a special effort was made to secure the particular subjects shown.

In the preparation of this table, no reference has been made to the movie maker's own films. These can be readily substituted, reel for reel, in place of any suggested subject in the table. If the movie show is in the nature of a formal entertainment, a balanced program of half library reels and half home-made reels is recommended. Of course it goes without saying that only home movies of exceptional merit should be exhibited at such an entertainment. It is often wise to show only a single home-made reel! This reel should be built up of the best available material and should be considered as a "show-off" reel. Every movie maker should endeavor to build up an "exhibition library" from his best material by making up a reel for each general subject, for example, one family reel, one travel reel, one reel of local events and, perhaps, one reel of scenic wonders. It is easy to build up such reels as most movie makers accumulate considerable film and it is very little trouble to splice the best scenes on to the proper exhibition reel.

The secret of successful showmanship is to avoid giving your audience too much. It is far better to leave the audience clamoring for more than to give a long, tiresome program. When in doubt, make the show too short rather than too long and, above all, remember that, in projection programs especially, variety is the spice of life.

Audience	Two 400 Foot Reels Half hour Show	Four 400 Foot Reels One Hour Show	Six 400 Foot Reels Hour and half show
JUVENILE	2 Reel Feature Comedy a) Slap-stick style b) Animated Cartoon c) "Our Gang" type ---- or ---- 2 Reel Child Story a) Fairy Tale b) Animal Story	1 Reel Natural History a) Animal or bird life b) Scenic wonders 1 Reel Comedy a) Animated Cartoon b) Dog or Monkey Comedy c) Rough and tumble type 2 Reel Child Story a) Fairy Story b) Wild West Story c) Historical epic type	1 Reel Nature picture 1 Reel Popular Science 1 Reel Animated Cartoon 1 Reel Travel a) Foreign child life b) Historic Scenes 2 Reel Comedy
COLLEGIATE	1 Reel Sports a) Athletic Contests b) Wild West Rodeo c) "How to do it" type 1 Reel Comedy a) Romantic type b) Bathing girl type c) Clean cut stunt type rather than slap-stick	1 Reel Sports 1 Reel Comedy 2 Reel Feature Story a) Western Action type b) Light romantic type c) Newly-wed light comedy d) Flaming youth or flapper jazz life story	1 Reel Sports 5 Reel Feature Story a) Western Action b) Mystery thriller c) Gangster type d) Romantic love story e) Jazz night life type e) Airplane romance (Avoid tragedy, classics, and religious stories)
ADULT	1 Reel Travel or scenic a) Unusual foreign b) Scenics with action c) Scenic sport such as fishing or hunting 1 Reel Feature Comedy a) Domestic married life b) Light Romantic type c) Clever stunt type	1 Reel Travel or Scenic Wonders 1 Reel Light Comedy 2 Reel Dramatic Feature a) Gripping Dramatic type b) Stories of society or business life c) Eternal triangle type	1 Reel Travel or Scenic 5 Reel Dramatic Story a) Problen Play type b) Society Drama c) Heart-throb Drama d) Detective mystery e) Sophisticated type

Table of Suggestions for Home Movie Programs

Of Interest to Amateurs

New Eyemo Key

USERS of Eyemo Cameras who have long wished for a winding key which can be left permanently in its socket in the camera, may now have their wish fulfilled. Such a key, according to announcement by Bell & Howell, is now available.

This key is of the new folding, ratchet type, similar to the key now furnished with Filmo 70 cameras, and may be left permanently attached to the Eyemo or detached at will. It should be a great convenience.

Oiling Filmo Projector

BELL & HOWELL give the following information which should be of value: "If your Filmo Projector bears the serial number 47313, 47316, or a higher number than the latter, be guided by the following directions in oiling it: The machines specified do *not* have the two oil holes on the clutch side which are indicated by the letters 'B' in Figure 19, Page 22, of the latest Filmo Projector instruction book, Form No. 15,011. Instead, an oil hole at the top of the gear case, near the oil cup, is employed to lubricate the main bearings."

The Cinophot

IF you are addicted to over-expose your pictures because of the intensity of mid-summer light, you will find the Cinophot, a compact and handy exposure meter, one of the most valuable bits of your cinematic equipment. This meter insures accurate exposure and is so small it can be carried comfortably in the coat pocket. The Drem Products Co. supply these exposure meters for any type of camera and an amateur will find one invaluable.

Watch Water

NEVER allow excitement to spoil a good picture. Always be careful. Better miss a picture than spoil it. Blurred pictures are often caused on rainy days, or when you are shooting near a waterfall, by water splashing on your lens. No matter how great the excitement, take time to look at the lens, and if it is wet, dry it with a clean, soft, lintless cloth.

Heinz Products

REPORTS from the Movie Specialty Manufacturing Company, of Los Angeles, indicate that the new matte-box, micro-focus meter and title hood introduced by this firm last month, are making a decided hit with the amateurs. These three new products give the amateur the tricks of the professional and should have a big sale.

Preparedness

IT IS a pretty good rule to always keep your camera loaded. You never know when something of interest will turn up. If you have to load your camera, you may find yourself in a position similar to a hunter who carries an empty gun as the game is flushed.

Remote Control

MUCH pleasure may be derived from the use of the remote control for the Filmo 70 camera. Pictures you would never get are possible at a distance up to fifty feet. For nature studies we can think of nothing more useful. Try it on that little song-bird in your front yard some morning.

Preserve Your Films

UNLESS you take care of your films you will discover, some day, that perhaps the most valued picture you have taken is ruined. The material from which film is made grows brittle with the passing of time. The film cracks and picture is ruined. If the film-owner takes necessary precautions, this can be avoided. There are various processing methods of excellent repute on the market which preserve films throughout the years. Kleena-fylm is one agency that gives this preservation. A little on a blotter placed in the film can occasionally will save that precious film.

"Trial Mates"

ONE of the most charming and interesting 16 mm. pictures to come out in months is "Trail Mates," offered the public by Veritas Films, 829 Harrison Street, Oakland, California.

This subject, 800 feet length, was made in Alaska by Captain Jack Robertson and is a masterly bit of photography, carrying with it a theme of tense interest. The picture is being acclaimed by all who see it as the finest motion picture brought out of Alaska. Veritas has it ready for the owners of home projectors. Incidentally, this form has a series of ten one and two hundred foot reels of tremendously interesting pictures shot in Alaska, showing life as it is there.

How Professionals Make Up

June Collyer and Helen Twelvetrees Give the Amateurs Some Inside Information on the Art of Making Up for the Screen.

By James M. Fidler

WHY is it that so many of my friends, many of them beautiful girls, do not photograph well? Why do they seem to have dark circles under their eyes and blotches on their faces when we project our 16 m.m. pictures on our home screens?"

This question is one that amateur cinematographers and amateur players are continually asking whenever they have the opportunity to get in touch with any professional. Again and again the amateur points out that he has been particularly careful about his lighting, but the faces of the beautiful girls still look muddy and unattractive.

The answer usually lies in the art, or lack of art, in making up. The amateur buys his or her makeup and proceeds to apply it as he or she thinks best. The result brings tears.

June Collyer, brunette, and Helen Twelvetrees, blonde, Fox stars, have come to the partial rescue of the amateur readers of this magazine with an inside peep into just how they make up. A careful perusal of their methods may help.

Helen Twelvetrees

"Poor makeup," says Miss Collyer, "can spoil the appearance of the most beautiful girl for the screen. And, it must be remembered that what makes a blonde beautiful will make a brunette look a fright.

"In making up for the screen, my first step is to go over my face thoroughly with cold cream," Miss Collyer explains. "This is rubbed into my skin so that the grease paint, which is put on next, may lie smooth. After the grease paint (I use natural pink) is evenly spread, I use ice water to pat it in. This water prevents shininess, and is an important part of the process.

"After this, the face powder. I use pan-chromatic, also natural pink. This I put on with a powder puff. I then pat it carefully into the grease paint with my hands. Next, I brush away the surplus powder, leaving a smooth, velvety finish.

"Next comes a small portion of brown eye-shade, rubbed softly as a shadow around the eyes. This must be very soft, else the camera will cause big hollows to appear where the brown shading has been applied. I next use a brown eye-brow pencil to outline my eyebrows and brown mascari for my lashes.

"My lipstick synchronizes with face powder in color. Before putting this on, I make sure that all powder has been removed from my lips. If any clings, the rouge will not be even and may cast shadows in photographing. This is something to watch carefully. For my hands and arms, I use a liquid makeup of natural shade. This is carefully rubbed on, is allowed to dry and is then brushed off very smoothly and softly. Always watch for smoothness."

Miss Twelvetrees, describing the method she employs to makeup for the screen, said as follows:

"I use Max Factor's number 24 screen makeup. After first applying a coat of cold cream to cleanse the skin and to form a base for the makeup, I put on the grease paint. This I rub into the skin. I use a natural tan shade, light. After the grease paint is adjusted, a pan of cold water into which I dip my hands is nearby. The cold water, carefully patted over the grease paint, removes shininess and promotes smoothness.

"Next, I put on a small quantity of eyelid shade, tan in color. I then put on a reddish brown lip stick, heavier than I use for ordinary street wear. My next step is to put on the powder. This is also a very light tan in color. I apply it with a fluffy powder puff, using plenty of powder. I then pat the powder into place, afterward brushing away the surplus powder with a soft bristled brush (we call them 'baby brushes'). Be sure that all powder is removed from the lips and eyelids. If necessary, both can be retouched.

"I use a dark brown mascari and I give the lashes a fairly heavy coating. *I suggest this particularly for blondes with blue eyes as it helps to bring out the lighter colored eyes.* It is not necessary with dark-eyed girls.

"For my arms, hands and shoulders, I use a light tan shade of liquid makeup, rubbed in thoroughly and brushed off after drying."

Miss Collyer's new pictures, soon to be released, are "Magnolia" and "Illusion." Miss Twelvetree's late pictures are "The Ghost Talks" and "Blue Skies." After reading the descriptions the two players give for their screen makeups, a visit to see them as they appear on the screen might prove wise for the amateur photographer who wishes to see just what results are achieved by these two girls.

Miss Collyer adds one word of warning to girls who apply their own make-up for amateur film work. It is: Watch your eyes. Do not dab great gobs of blue, green or brown around your eyes. Experiment and do not put on so much that it gives you rings around the eyes."

Questions regarding make-up by amateurs will be answered by Max Factor, noted make-up authority, if sent to the Amateur Department of this magazine.—EDITOR'S NOTE.

June Collyer in her dressing room at the Fox Studios in Hollywood

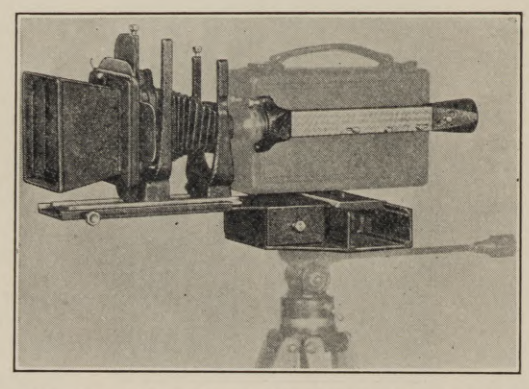
FORMER AUTOMOTIVE ENGINEER AIDS SERIOUS-MINDED AMATEURS

Shots Demanding Gauze-Vignettes, Multiple Filter Combinations, Dissolves and Multiple-Exposure Effects Now at Command of Amateur.

By WILLIAM STULL, *A. S. C.*

UNTIL very lately the development of amateur cinemachinery has been more in the line of producing cinematic Brownies for the many, than in making motographic Graflexes for the advanced few. Rightly so, too, for though there were thousands of potential beginners in cinematography, there were few, if any amateurs sufficiently advanced to handle apparatus of any great refinement.

Now, however, conditions are changing. Throughout the world are thousands of expert cine amateurs who have completely mastered their simpler outfits, and are eagerly seeking new worlds to conquer. In recognition of this the various manufacturers have from time to time brought out new models and accessories, progressively widening the scope of their various products. Lens-turrets and multispeed movements have greatly increased the flexibility of the amateur cine, and amateur slow-motion and natural-color cinematography have been made possible.



Matte Box and Micro-Focus Meter on Cine Kodak with tripod.

None the less, the artistic standard of most amateur cinematography has been more closely that of the newsreel than that of the studio. This has not been due to any lack of artistic perception on the part of the amateur, but merely to lack of specialized equipment such as the studio cinematographer uses to enhance the beauty of his scenes. In the first place, the amateur was forced to compose his picture solely through the small finder on his camera; a device which is thoroughly satisfactory for sighting ordinary shots, but entirely inadequate as a means of accurately studying and arranginb the artistic composition of important scenes. In addition, focusing could only be accomplished by means of the scale engraved on the lens, dictated either by personal judgement or, occasionally, by a pocket range-finder. Under such conditions, the artistic results sometimes achieved are truly noteworthy.

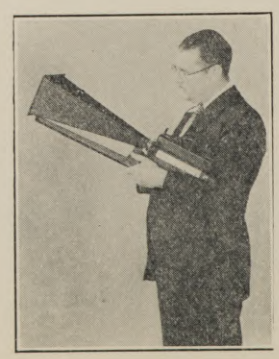
Secondly, the matte-boxe—the professional cameraman's most vital accessory—simply didn't exist in the realm of amateur apparatus. Shots demanding gauze-vignettes, multiple filter combinations, moonlight or fog effects, dissolves, and multiple-exposure effects were nice things to see in a theatre, but for practical purposes they were absolutely impossible. Professionals might make them —but amateurs? Oh no! Refinements for the production of such effects were built into studio cameras as a matter of course, but were thought far too advanced for incorporation in any amateur apparatus. Amateurs might long for them, but that was all; they simply couldn't get them anywhere.

However, as cine amateurism spread, the number of advanced amateurs capable of using such devices has also increased. To them it will be of great interest to learn that such devices are at least available for use with all amateur cameras, using focusing mount lenses. Within the last month there have appeared on the market two auxilliaries of proven worth, which may be incorporated with any 16mm. cine camera, and which give it all the flexibility and refinement of the most expensive professional models. These devices are the invention of O. W. Heinz, of Los Angeles, and are, respectively, a micro-focus meter and matte-box for amateur cameras.

The first of them, the micro-focus meter, is essentially a focusing tube which is mounted at the side of the camera. At the forward end is provided a lens-mount identical with the one on the camera, into which the lens may be quickly slipped; at the opposite end is an eyepiece, adjustable to individual requirements, through which the image cast by the lens is seen, erect, and magnified 15 diameters, or, for critical focusing, 22 diameters. The lens can thus be focused with absolute accuracy, after which it is replaced in the camera, and the scene photographed. An exposure-meter is also provided in the form of a blue glass filter which drops into the tube at the touch of a lever, after which the lens-diaphragm is manipulated until the detail in the shadows is only just visible. At this point the setting is absolutely correct for perfect exposure.

The micro-focus meter does not require a tripod, any more than the camera does alone, but, as has been frequently pointed out, a tripod is never out of place in cine work; and, in conjunction with this accessory, a tripod forms an added assurance of perfect results. Of course in telephoto work a tripod is indispensible, and here, as in color work, where accurate focusing is so vitally important, the micro-focus meter is a most invaluable aid. In fact, for this class of work, to say nothing of its utility in general use, it is probably the most valuable all-around accessory that could be added to any camera, for it banishes the old-time bugaboo of 'amateur fuzz,' gives the amateur a chance to carefully compose his picture, and saves a great deal of film otherwise wasted on poorly-focused or uninteresting scenes. In a word, it is the first great step in taking the cine camera out of the Brownie class. The new matte-box is primarily intended for use with the microfocus meter and a tripod, and adds to any 16 mm. camera the advanced features of the finest professional apparatus. In fact, it has some conveniences which would be welcomed on professional equipment. The matte-box itself is practically identical with the best professional models, and includes the customary sunshade, adjustable bellows, iris, three filter or matte-holders, and a set of vertical and horizontal dividers. The ensemble is so mounted that the units may be swung in any direction, either individually or collectively. The whole is mounted on a double-extension rack-and-pinion mount, so that it may be used with any lens, including telephotos. To the rear, the

Using Micro-Focus Meter without tripod.



Shooting a title with Title Hood.

camera is mounted on a swinging base, so that it, like a professional camera, can be swung to one side while shot is being lined up through the micro-focus meter, and then swung back so that while photographing the lens is in exactly the same position occupied while focusing. Underneath the mounting are drawers in which gauzes and filters may be kept. In short, every refinement and advantage offered by the most costly professional outfits is embodied in these devices, which can be added to any amateur camera. With them practically everything in the professional's bag of tricks is available to the expert amateur.

In addition to these two appliances, the same firm also offers an unusually practical tilting outfit. It consists of a simple metal hood which fits over the lens of the camera, and carries at its outer end a slit into which the title to be photographed is slipped. The title-card is considerably larger than the ones generally used in amateur tilting devices, and allows much greater freedom in the style of lettering, decorations, etc.

The lettering may be written, typed or printed on any translucent material desired, after which the making of the title is simplicity itself, as all that is necessary is to slip the title into the hood, point the camera toward the light, and shoot. The range of effects is almost unlimited. Everything from the simplest 'on the spot' memoranda to the most intricate trick and art-titles can be made. With a transparent base for the lettering, moving backgrounds can be used, and dissolves made from title to scene with telling effect. The device also offers a most simple way of making animated cartoons, maps, and titles. And since approximately 1/3 of the footage of a silent picture is usually devoted to titles, its value is obvious.

These three articles are the creation of O. W. Heinz, of Los Angeles, who enters the new field of activity after a long and distinguished career as an automotive engineer. "I came to California," he states, "several years ago, in the course of an automotive survey for an Eastern firm. Once here, I liked it far too well to be satisfied anywhere else, so eventually I settled in Los Angeles. In my work there, I found it necessary to employ 16 mm. movies for instructing large staffs of subordinates. The more I worked with the films, which I made myself, the more enthusiastic I became about them; but I found so many limitations—so many things I wanted to do, but couldn't, that I began to get irritated.

"Finally my mechanical training got the better of me, and I decided to work out some accessories that would enable me to do what I wanted with my camera. The result is embodied in these three devices. The first models of each attracted so much favorable comment from both amateurs and professionals that I was finally persuaded to arrange for their manufacture. Though they have only been announced for a very short time, the reception they've had everywhere to indicate that I wasn't wrong in my decision, and that there are many serious amateurs everywhere who welcome these devices as a means of adding the professional touch to their pictures."

Dunning Process Company to Build New Plant

CARROLL H. DUNNING, head of the Dunning Process Company, Hollywood special process technicians, has announced that his concern is now having plans prepared for a new plant.

Land has been purchased on La Brea Avenue, south of Santa Monica Boulevard. The building will be two stories high, and will cover an area of 50 by 100 feet. Mr. Dunning says that when the new plant is completed it will enable his firm to do eight times its present business.

Present plans call for every modern device and bit of equipment for special process photography and title work.

France

Mr. Henri Pathe, French Under-Secretary of State, has caused a series of lessons on Physical Culture to be reproduced in a film, which will be exhibited in various schools and colleges in order to propogate rational methods of physical training.

An interesting invention was recently demonstrated in Paris by Dr. Couchoud. Proceeding from the fact that the retina of the human eye is concave, Dr. Couchoud is showing motion pictures on a concave screen. The films thus exhibited cannot be defined as "stereoscopic films," but they give a much greater impression of relief than a picture projected on an ordinary screen.

Russia

A Japanese film exhibition is now to be seen in Moscow. It provides a very clear picture of the present status of the Japanese production and of its peculiar character.

Solving the Ice-Box Problem

(*Continued from Page 7*)

provided at the rear through which it may be viewed. Another important addition, for which Mr. Toland is responsible, is a device by which the focus may be adjusted from the outside. The lens-mount is made with a V-shaped groove in which a small belt fits, and extends to a pulley below, to which is attached a dial calibrated for several lenses. As the position of this lower assembly is adjustable, it can quickly be adopted to any lens. This improved "Blimp" can be used from a tripod, but it is generally mounted on a special perambulator, whose height is quickly adjustable, and which makes moving shots even more conveniently easy than they were before sound pictures came.

At the Pathe Studios, the problem was tackled by Art Director Edward Jewell, who has turned out one of the most original devices of its kind. Externally, it looks more like an Indian cliff-dwelling gone astray than anything else, but it works, and is a very satisfactory silencer. It is made of two papier-mâché shells, between which is a layer of sound-absorbent material. At the front a flaring opening surrounds a removable glass window, through which both lens and finder peer. The matte-box is inside the case, as is the motor, making a very convenient, self-contained unit. There is provision made for following focus on moving shots, the focus being indicated on a scale below the front of the camera. The unit is used on any standard tripod, but insulated from actual metallic contact therewith by its over-hanging base. A unique feature is the absence of doors for getting at the camera within: instead of this, the whole device is separable from the base, and may be lifted completely away from the camera—hence its nickname "the Hat." Several of these devices have been made, and found satisfactory under production conditions by such members of the Pathe camera department as Arthur Miller, A. S. C., and Norbert Brodine.

At the Paramount Studio, the chief cameraman, Virgil Miller, A. S. C., has, after much research, adopted a device known as the "Baby Booth." This device is the creation of Roy Hunt and Robert Smiley, of the camera department, and is just what its name implies—a miniature booth. It is a good-sized, square box built around any standard camera, and constructionally very like the big booths. It stands on a special tripod which has, in addition to its legs, a three- wheeled undercarriage which is raised or lowered by the turn of a crank, and which can be entirely removed, if necessary. The "Baby Booth" itself is sufficiently large to allow ample working space around the camera, or to accommodate even the wide-film outfits now being experimented with. The device retains the familiar optical-glass window in front, on which provision is made for mounting mattes and gauzes, and around which is built a large metal sunshade. Both the finder and motor are contained inside the case, making the unit an extremely mobile one.

Inside, it is probably the most luxurious device in use, for it furnishes the cameraman with every possible convenience. There are small lights for illumination while threading the film; an automatic clutch which disconnects the motor while threading the film, or whenever a buckle occurs; a "bloop light," for marking the starting-point of a scene, which may be worked from either inside or out of the booth; and an extremely accurate device for focusing, which operates from the outside, and which moves the finder to exactly agree with the changing focus of the lens. The focusing arrangement consists of a permanent lens-mount, into which all the lenses fit, around which a small chain operates, connecting with a lever on the outside of the booth, and a large indicating quadrant inside. This indicator is at the rear of the case, easily visible through the large rear window, and illuminated by a small lamp contained in the pointer. The calibrated scales on the indicator are interchangeable, so that each lens has its own accompanying scale; as these scales are absolutely accurate, the value of this feature for present-day cinematography is obvious.

The Paramount Studio is at present experimenting with a special camera of their own manufacture for use with these "Baby Booths," but current production is being carried on with standard Bell & Howell and Mitchell sound cameras. The "Baby Booths," themselves, are so completely successful that the studio is completely equipping itself with them as fast as they can be made. During the experiments which finally resulted in this accepted model of the device, a number of interesting designs were tried, including one which embodied a layer of glass in its walls, to achieve the maximum silence with the minimum bulk.

In the same line—that of securing silent operation with minimum bulk—a number of individual cinematographers have carried on much worthy research. At the Tiffany-Stahl lot, Jackson Rose began by ruthlessly ripping the glass from his booth, and substituting sheets of sound-absorbing felt, leaving only a small hole to photograph through. This was so successful that he next made an overcoat for his camera, a padded robe so suggestive of "Spark Plug's" famous attire that the staff at once dubbed it a "Barney Google." It is literally an overcoat to be thrown over the camera, allowing the lens to project from the front, the finder from the side, and the motor-cable from the rear. The afterpart is fitted with a "Zipper" fastening, so that immediate access may be had to the camera without removing the whole cover, and a small window is left just over the take-up pulley, as a check against buckles, and such mishaps. The device is so simple and practical that its use should spread to all companies using adequately silent cameras.

Another similar device is the most original one made by Joseph Walker, A. S. C., at the Columbia Studio. Walker decided that, since the main thing was to prevent the noise of the camera from escaping, the logical process was to catch it as near the source as possible. Therefore he devised a regular suit of armor for his camera—a set of back-and-breastplates of moulded sponge-rubber, covered with leather, which fit directly onto the camera, parts of which have already been treated with acoustic padding within. Covered this way, the camera is scarcely larger or heavier than before, and all controls are readily accessible, yet the major part of the noise is effectually smothered. For safety, a sheepskin hood is thrown over the camera, and the outfit is ready to work.

The final step in this direction is that taken by the Fox Studio, where blanketed cameras—specially treated to reduce their noise-making capacity—are used for all purposes. And as the manufacturers are steadily improving their products, it is hardly to be doubted but another year's progress will see camera booths entirely eliminated, and cameras being used as freely as before. When such is the case, a very great share of the credit will belong to the cinematographers and other technicians whose artistic devotion and inventive genius have again triumphantly risen to surmount the obstacles of the apparently impossible; to the men who don't know how to say, "It can't be done!"

Heat Treatment of Steel

"The Heat Treatment of Steel" is the subject of the latest addition to the library of educational motion picture films produced by the Department of Commerce for the visualization of the mineral industries of the country. The film was made, under the supervision of the United States Bureau of Mines, in co-operation with one of the large automobile manufacturing companies. It is brought out that some 1475 separate steel parts of a typical automobile must be given special heat treatment, illustrating forcibly the importance of this process in the automotive manufacturing industry.

The film begins with a few scenes illustrating the early days of motoring and recalls to mind the fact that the automobiles of the nineties were extremely uncertain quantities as compared with the dependable and efficient motor cars of today, which the heat-treatment process has helped to make possible.

The old-time methods of tempering steel, with anvil and forge, when the color of the metal alone indicated the degree of tempering, are shown. Then in contrast, the various steps in the modern methods of heat treatment, utilizing specially designed furnaces subject to the utmost precision of control, are illustrated. The heat treatment of steel, it is pointed out, is the process of so heating and cooling the metal as to intensify the hardness, toughness or flexibility of the steel.

It is shown how the furnaces are heated by crude oil under pressure, constituting a baking process with the source of the heat away from the metal. The use of extremely delicate electrical temperature indicators, or pyrometers, for the automatic regulation of the high temperatures is visualized. Other scenes show the cooling of the heat treated parts in an oil bath, composed of 4,000 gallons of special, expensive oil kept in constant circulation.

The various steps in the forging of the front axle of an automobile are depicted, from the time that the chemist analyzes the steel for the carbon content which determines the extent of heat treatment required. Microscopic comparisons of the steel before and after its subjection to the heat treatment process are shown. The process of surface hardening of the steel parts is also depicted. Various processes of physically testing the heat-treated steel are illustrated.

Copies of this film, "The Heat Treatment of Steel," are now available for exhibition by educational institutions, churches, clubs, civic, business and military organizations, and others who may be interested. Applications for the use of the film should be addressed to the Pittsburgh Experiment Station of the United States Bureau of Mines, Pittsburgh, Pa. No charge is made for the use of the film, although the exhibitor is expected to pay the cost of transportation both ways.

Some Properties of Fixing Baths

(*Continued from Page 19*)

(2) The nature and degree of exhaustion of the fixing bath.
(3) The temperature of the fixing bath.
(4) The degree of agitation of the film.

(1) In general, course-grained emulsions fix much more slowly than those composed of finer grains. For example, under any given conditions Eastman motion picture positive film fixes in about one-fifth the time required for Eastman negative motion picture panchromatic film. A thickly coated emulsion obviously fixes more slowly than one of less thickness.

(2) The times of fixation for various concentrations of sodium thiosulfate at 55° F., 65° F., and 75° F. for Eastman motion picture positive and negative panchromatic film are shown in Fig. 2. The negative film fixes most rapidly in a 40% solution which corresponds with the results of Piper [10] and Lumière film, while with Eastman positive motion picture film a 30% solution gives the most rapid fixation.

Some workers have contended that the hardening of a gelatin film does not affect the rate of fixation while others maintain that it does. Sheppard and Mees[11] found that formalin hardening does not affect the time of fixation and state that in the case of hardened film which does not melt at 212° F. as compared with a film melting at 105° F., the time of fixation is the same in both cases. Experiments by the authors have indicated that although an excessive quantity of the hardener constituents retards fixation, for all practical purposes when using normal hardening baths with motion picture film, the hardener does not materially affect the time of fixation.

Strauss[12] and Lehmann and Busch[13] have observed that the accumulation of potassium iodide in a fixing bath used for fixing bromo-iodide emulsions has a considerable retarding effect on the rate of fixation. Experiments by Crabtree and Ross[14] indicate that the addition of 3 grams per liter of potassium iodide to a 30% hypo solution doubles the time to clear a negative emulsion at 70° F.

(3) The effect of temperature on the time of fixation is likewise shown in Fig. 2. With positive motion picture film an increase in temperature from 55° to 75° F. changes the time of fixation from 50 seconds to 30 seconds in a 30% hypo solution, while with negative film the same temperature change alters the time of fixation from 3 to 2 minutes in a 40% hypo solution. For maximum efficiency it is therefore necessary to maintain the temperature of the fixing bath not lower than 65° F.

(4) The effect of agitation on the rate of fixation is shown in the following table:

TABLE I

Hypo Conc.	*Nature of Film*	*No Agitation*	*Agitation every 30 Seconds*	*Continuous Agitation*	*Brush Treatment*
35%*	Eastman Panchromatic Negative	120 sec.	120 sec.	105 sec.	90 sec.
35%	Eastman Motion Picture Positive	35 sec.		35 sec.	30 sec.
10%	Eastman motion Picture Positive	150 sec.	120 sec.	90 sec.	75 sec.

*Crystalline hypo was used. A 35% solution was prepared by dissolving 35 grams in water and then adding water to make 100 c.c. of solution.

It is seen that with motion picture negative film a very thorough renewal of the fixing bath at the surface of the film by brushing causes the emulsion to clear in 90 seconds at 65° F. as compared with 120 seconds with no agitation in a 35% hypo solution. Conditions of agitation analogous to those produced by brushing rarely exist in practice.

With positive motion picture film agitation has little effect under the same conditions although with a 10% hypo solution the time of fixation is cut in half by brush treatment. The rate of agitation produced in the average processing machine corresponds approximately to that produced by hand agitation.

V. The Efficiency of Acid Hardening Fixing Baths

The practical efficiency of a fixing bath is governed by the following factors:

1. *The absolute times of fixation when the bath is fresh and when exhausted.*

In practice with motion picture negative emulsions a fixing bath is considered exhausted when the time required to clear the film is excessive, the limit being usually from 10 to 15 minutes; that is, it is considered better economy to prepare a fresh bath than to waste time waiting longer than 20 to 30 minutes for the film to fix, although at this point the bath is not actually exhausted because an emulsion could be satisfactorily fixed by prolonged treatment. (In practice the rule "time of fixing = twice the time to clear" is usually observed.)

2. *The quantity of emulsion fixed during the active life of the bath.*

The active capacity may be defined as the quantity of film fixed

A. S. C. Resourcefulness

Here we see another useful article devised by an A. S. C. member. Frank M. Cotner is seen in his automobile, on the running board of which he has fstened a special "auto tripod" for his camera. The picture explains everything and tells its own story without verbal description. Cotner says the device has proven itself very useful in chase shots.

up to the point when the time required to clear the emulsion is greater than a definite limit. This varies according to the particular emulsion to be fixed, the active capacity being much less in the case of slow fixing emulsions than in the case of rapid fixing emulsions which are usually more fine grained.

3. *The staining limit of the bath.*

That is, the quantity of emulsion fixed before the bath stains the film with average manipulation. Staining in a fixing bath may be a result of (a) insufficient fixation or (b) lack of agitation especially in the presence of free developer. If the film is insufficiently fixed any residual silver thiosulfate ultimately decomposes producing a brown stain. Also, if the bath becomes alkaline because of developer carried into it by films, the free developer reduces the silver thiosulfate in the film to finely divided metallic silver *in situ* causing dichroic fog.[2]

4. *The cost of fixing bath.*

Although with negative motion picture film a 40% solution of hypo gives the most rapid fixation as compared with 30% solution for positive motion picture film, the question arises as to whether the extra cost of the more concentrated solution is justifiable by the slightly shorter time of fixation. For average use, a 25% solution of hypo is satisfactory for fixing both positive and negative motion picture film though if time is the most valuable consideration a 40% solution for negative film is desirable.

(To be Continued)

REFERENCES

1. A Non-turbid Fixing Bath containing Alum by A. Lainer. *Phot. Korr.* 26: 311 (1899).
2. Stains on Negatives and Prints by J. I. Crabtree. *Amer. Ann. Phot.* 25: 204 (1921); *B. J. Phot.* 68: 294 (1921).
3. Chemistry of the Acid Fixing and Hardening Bath by S. E. Sheppard and A. Ballard. *J. Frank. Inst.* 200: 537 (1925).
4. The Development of Motion Picture Film by the Rack and Reel Systems by J. I. Crabtree. *Trans. Soc. Mot. Pict. Eng.* 16: 163 (1923).
5. Rapid Fixing Baths by E. J. Wall. *Amer. Phot.* 366 (1923).
6. Chemistry of the Acid Fixing Bath by S. E. Sheppard, F. A. Elliott, and S. S. Sweet. *J. Frank Inst.* 196: 45 (1923).
7. High Temperature Development of Film and Paper by J. I. Crabtree. *B. J. Phot.* 64: 555 (1917).
8. On Convection Effects in Photographic Bathing Operations by E. R. Bullock. *B. J. Phot.* 69: 110 (1922); *Amer. Phot.* 16: 162 (1922).
9. The Fixation of Photographic Plates by A. Lumiere and A. Seyewetz. *Bull. soc. franc. phot.* 11: 66 (1924).
10. The Time of Fixation by C. Welborne Piper. *B. J. Phot.* 60: 59 (1913).
11. *Investigations on the Theory of the Photographic Process* (1907) p. 123. Longmans Green & Co., London.
12. The Fixing Bath and Time of Fixation by P. Strauss. *Phot. Ind.* 911 (1925).
13. Fixing Baths and their Best Utilization by E. Lehmann and L. Busch. *Kinotech. Jahrbuch* 114 (1925-1926).
14. The Recovery of Silver from Exhausted Fixing Baths by J. I. Crabtree and J. F. Ross. *Amer. Ann. Phot.* 14 (1927).

New Kodacolor Stations

LAST MONTH we published a list of the foreign stations at which users of Kodacolor may have their film processed. Since then the following stations have been completed with equipment to serve the amateurs. We suggest that travelers paste the complete list onto a card which they can easily carry in the same bag with their extra film. The stations are:

Madrid, Spain: Kodak Sociedad Anónima, Puerta del Sol, 4.
Buenos Aires, Argentina: Kodak Argentina, Ltd., Calle Paso, 438.
Gothenburg, Sweden: Hasselblads Fotografiska, A. B., Ostra Hamngatan 41-43.
Oslo, Norway: J. L. Nerlien, A. S., Nedre Slotsgate 13.

In the United States and Canada, Kodacolor Film is being processed at:

Rochester: Eastman Kodak Company.
Chicago: Eastman Kodak Company, 1727 Indiana Ave.
San Francisco: Eastman Kodak Company, 241 Battery St.
Kansas City, Mo.: Ciné-Kodak Service, Inc., 422 East 10th Street.
Jacksonville: Ciné-Kodak Service Co., Inc., 315 West 8th St.
Toronto: Canadian Kodak Co., Ltd., Toronto 9.

Foreign Stations

Kodacolor Finishing Stations abroad are located as follows:
London: Kodak, Ltd., Kingsway, W. C. 2.
Paris: Kodak Pathé, Place Vendome, 28.
Berlin: Kodak Aktiengesellschaft, Leipzigerstrasse 114.
Milan: Kodak Societa Anonima, Corso Vittorio Emanuele 34.
Madrid: Kodak Sociedad Anonima, Puerta del Sol 4.
Gothenberg: Hasselblads Fotografiska, A. B., Ostra Hamngatan 41-43.
Oslo: J. L. Nerlien, A. S., Nedre Slotsgate 13.
Batavia, Java: Kodak, Ltd., Noordwijk 38, Weltevreden.
Singapore: Kodak, Ltd., 8 Battery Road.
Melbourne: Kodak Australasia Pty., Ltd., 284 Collins St.
Calcutta: Kodak, Ltd., 17 Park St.
Cape Town: Kodak (S. A.) Ltd., 38 Adderley St.
Honolulu: Kodak Hawaii, Ltd., 817 Alakea St.
Havana: Kodak Cubana, Ltd., Zenea 236.
Panama City: Kodak Panama, Ltd., Edifico Grebmar, Avenue Pablo Arosemena.
Buenos Aires: Kodak Argentina, Ltd., Calle Paso 438.
Lima: Kodak Peruana, Ltd., Divorciadas 650.
Santiago: Kodak Chilena, Ltd., Alameda 1478.
Mexico City: Kodak Mexicana, Ltd., Independencia 34.

Germany

A German film week will be held in Baden-Baden and Breslau this month.

Negotiations are under way in Germany between the A. E. G. Electric concern and the Leitz factories in view of amalgamation of the two companies. The A.E.G. will, at the same time, acquire the right to construct the Meschau projector produced by the Leitz factories. This transaction is said to be in connection with the A.E.G.'s sound film interests.

The Ufa Sound Studios at Neubabelsberg (Berlin) have in six weeks continuous work so far been completed that the wiring and installation of machinery can begin. For acoustic reasons no windows have been built and the doors have been constructed in a particular way; no iron was used, the walls being made of strong burnt bricks. For the lighting, only incandescent lamps are used, having a strength of several hundred thousand candlepower. To combat the heat of lighting and to remove the dust, all the air of the vast building will be renewed six to eight times every hour. Ventilating must be absolutely noiseless and the ducts must also be soundproof against outside noises. A complicated system of signals will be fitted and every visitor will be "signalled" to the producer. A large number of scientific experts of Berlin have been consulted by the architects, Herr Otto Kohtz, and the engineer, Herr Otto Zucker. The building has the shape of a cross; four stages of sixty to ninety and forty-five to seventy-five feet size at each side, and a hall with all the technical appliances forming the center.

Greece

The Malaria Association has produced a film of approximately 5,000 feet length showing various parts of Greece affected by malaria epidemics, the effect of the disease on the population and the means of preventing the propagation of epidemics.

Austria

The "Vita" Studio of Vienna, purchased by a British financial group some time ago, will be turned into a sound film studio for the production of "talkies."

Some Properties of Fine-Grain Motion Picture Developers

(*Continued from Page 14*)

tive to a relatively low gamma and the positive to a relatively high gamma.

(C) In order to increase the rate of development the alkalinity of the developer can be increased by increasing the borax content up to 20 grams per liter. An increase in the rate of development with no increase in solvent action may increase slightly the graininess of the negative.

(D) The rate of development can be decreased by lowering the concentration of the Elon, hydroquinone, and borax to one-half that present in the regular formula. Such a developer will give slightly less graininess than the regular formula. It is very suitable for machine development where the rate of flow of fresh developer can be adjusted to compensate for the depletion of the developing agents. Hydrated sodium sulfate can be added in various quantities up to 100 grams per liter to reduce still further the rate of development and reduce the graininess.

(E) The rate of development can be controlled by using 8 grams of boric acid and 8 grams of borax per liter in the usual formula. With a ratio of 8 to 8 the rate of development is not changed. By increasing the quantity of borax with a corresponding decrease in the boric acid content the rate of development is increased. By decreasing the borax content and increasing the proportion of boric acid the rate of development is decreased. The developers with the high concentration of boric acid have shorter useful lives because the reduction potential of the developing agent is lowered and they are more susceptible to the accumulation of reaction products of development.

(F) The borax developer formula is also satisfactory for the development of motion picture positive film, but the only apparent advantages over existing developers are that it does not give aerial fog when the film is developed on a reel, while it gives a relatively low maximum practical gamma. Tests to date have indicated that the borax developer does not produce images on positive film having appreciably less graininess than those produced by existing developer formulas.

Acknowledgment

The authors are indebted to Mr. T. Gaski of this laboratory, who assisted in the experimental work.

REFERENCES

13. The Action of Oxygen on Hydroquinone and Sodium Sulfite, by J. Pinnow, *Z. wiss Phot.* 11: 289 (1913).
14. Theory of Development, by A. H. Nietz, published by D. Van Nostrand Co. (1922).
15. Graininess on Motion Picture Film, by J. I. Crabtree, *Trans. Soc. Mot. Pict. Eng.* No. 27, 77 (1927).
16. A Developer for Fine Grained Images, by R. Namias, *Il. prog. fot.* 34: 283 (1927); *ibid.* 35: 133 (1928).
17. A Study in Methods of Development for Obtaining Fine Grained Images, by A. and L. Lumiere and A. Seyewetz, *Sci. Ind. Phot.* 7A: 107 (1927); and 8A: 3 (1928).
18. Fine Grained Development, by F. Veldman, *Das Atelier*, 35: 30 (1928).
19. Inorganic Desensitizers and Fine Grained Development, by Luppo-Cramer, *Phot. Korr.* 64: 169 (1927).
20. The Gevaert Special Film, by C. Emmermann, *Filmtechnik*, 3: 426 (1927).
21. Grain Size, Specific Surface and Ripening, by W. Nauck, *Kinotechnik* 9: 538 (1927).

Electro-Magnetic Recording

(*Continued from Page 16*)

have upon the record. It is well known that a magnet can be demagnetized when submitted to a severe shock. The author points out that the magnetic record is less liable to suffer injury through these causes than a phonographic record, due to the many windings of the ribbon which give it a great elasticity and ease the strength of the shock to such an extent that even if the record layers of wire is so small that it reacts against any injurious effects.

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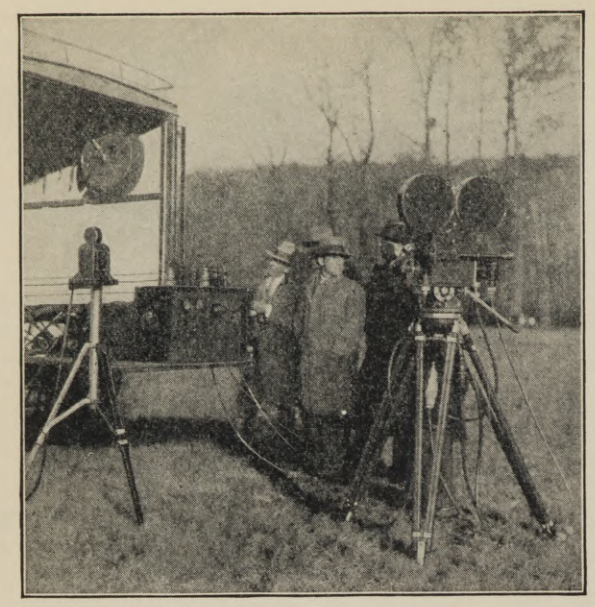

This illustration shows the Akeley Gyro Tripod in actual use by the Western Electric Company, taking sound moving pictures.

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"GIVE us the best camera tripod that human ingenuity can devise!" This was the demand of the sound cinematographers.

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AKELEY CAMERA INC.

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The Akeley Universal Gyro Tripod

Smith & Aller Provide Sets

(*Continued from Page 21*)

is anything that we have not provided, it will be gotten as quickly as a cameraman tells us about it. We feel certain that many cinematographers would like to have a place where they can come and shoot scenes and make experiments that they cannot do at the studios. And it is our hope that they will use this place to their hearts' content, and perhaps make contributions to the cinematographic field that they could never make if they had no place in which to experiment."

The new building of the Smith and Aller firm is a beautiful structure and has been designed with an eye to both beauty and practicability.

Color Moods

PSYCHOLOGY plays a tremendous part in life. This fact has long been recognized in many quarters, other than the college classroom, and business men who can point to a successful record invariably can trace much of their success to applied psychology.

In the motion picture business, perhaps more than anywhere else, psychology plays an important part; for on the emotions of the millions of theatre patrons depends the success or failure of pictures.

It was with a keen appreciation of this matter of psychology that scientists of the Eastman Kodak Company set to work on the preparation of the new tinted positive film which they have placed on the market under the name of "Sonochrome." And, after viewing the entire series of tints, used intelligently, the writer became just as celebrated over the tints as were the Eastman officials.

A description of these entrancing tints is almost impossible. One has to see them to appreciate them. For example, the writer had seen a certain talking picture in which a Latin-blooded girl and man enacted a rather passionate scene. It was excellent.

But when it was thrown on the screen in a "Rose Doree" tint the scene was lifted to another level. This rose pink fairly quickened the respiration, and instead of an ordinarily good scene it seemed as though these lovers, for the moment, had forgotten their world, and had been wafted to another realm on a fleecy cloud of passionate love. The music seemed better, the voices carried an added charm.

And so through the entire list of sixteen tints, the improvement over gray tones stood out like a beacon light. Firelight, Afterglow, Peachblow, Rose Doree, Inferno, Caprice, Amaranth, Fleur de lis, Purplehaze, Nocturne, Azure, Turquoise, Aquagreen, Verdante, Sunshine, Candleflame—these are the tints—entrancing, delightful, charming, effective—tints that work upon the emotions of the spectators and bring the moods desired. —[THE EDITOR].

Views Here and There Photographed for The Cinematographer

WHAT a merry life the cameramen lead in dear old Siam! Here we see Jack Smith, A. S. C. globe-trotter, doing his own laundry work while hunting elephants with Prince Svasti of Siam. The other photo shows the way cameras are carried in Siam. "Beats packing 'em on your back," writes Smith. Incidentally, Jack says that the King of Siam is seriously considering writing a special article for the American Cinematographer.

Charles Ford, Editor of the Chicago Daily News Screen Service, ready to go aloft in search of new pictures from the air? Mr. Ford always uses a Bell & Howell Eyemo which he has with him in this photo.

A corner of Max Factor's Laboratory where his famous make-up products are made.

Entrance to Smith & Aller's new film building, 6656 Santa Monica Blvd., Hollywood.

NEW ENGINEERING LABORATORY FOR BELL & HOWELL COMPLETED

Chicago Firm to Have 400 Technicians Working in New Building Devoted to the Picture Industry

ANOTHER outstanding milestone in the history of the Bell and Howell Company of Chicago, was passed with the recent completion of the new $500,000 Bell and Howell Engineering Laboratory.

The new laboratory represents the last word in modern engineering buildings and President J. H. McNabb and his entire group of associates may well feel proud of their new edifice as they receive the congratulations of the cinema and engineering world.

Nearly 400 engineers and technicians will be required to operate the highest standard machinery which will occupy the 35,000 square feet of floor space of the new building. This imposing personnel will be under the direction of A. S. Howell, Chief Engineer of the Bell and Howell Company, and who recently was elected to honorary life membership in the American Society of Cinematographers in recognition of his valuable contributions to the cinematographic field. This huge force of technicians will devote their time to new developments in the mechanics of the motion picture industry, whether originated within the Bell and Howell organization, or submitted to it by the industry as a whole or by individuals, says President McNabb.

The completion of this building is a real event in the cinematographic world, for no other industry requires more co-operation between manufacturer and the user of equipment than does the motion picture industry, which has in the past, and will in the future, owe most of its forward strides to the developments suggested by those responsible for the finished products—excellent film productions.

A thorough interchange of ideas is indispensable to the success of this industry which, more than any other, involves the application of science and technical knowledge.

Bell & Howell's New Engineering Laboratory, Chicago

Realizing the necessity of this co-operation, the Bell and Howell Company has spared no effort to provide it in the most efficient way. This is evidenced by the new Engineering Laboratory, and by the placing of the facilities of this laboratory at the disposal of the industry, and it is the hope of the Bell and Howell officials that in the new building advances in the motion picture development will be made that will be of untold benefit to the entire industry.

Since the advent of talking pictures many changes have been brought about in the picture industry and many new wants have been uncovered. The officials of Bell and Howell Company feel that this new building fills a long felt want which has been even more pronounced since the talkies have added new problems; and they feel that this epochal advance has, so to speak, freed the industry from the routine system and brought to its consciousness the necessity of organizing its future developments on a sound scientific and technical basis.

The wisdom of this policy has been recognized by the Bell and Howell Company since its very inception, twenty-five years ago, and has been proved by the fact that most of the motion picture standards used nowadays throughout the world have emanated from the Bell and Howell Laboratories. Also, the company has always been ready, almost upon demand, to modernize its cameras, printers, perforators, or whatever machinery was demanded by the industry, according to the exigencies brought about by the constant progress in the art.

The new Engineering Laboratory and the recognized ability of the engineering force will add considerably to the facilities that the Bell and Howell Company will be in a position to offer to the profesional motion picture field.

Sound and talking pictures have opened entirely new and unlimited fields for advances in motion picture production. Color photography, wider width of film, and perhaps setreoscopic effects will be the next most striking developments which the industry will witness.

The Bell and Howell Company is ready to cope with the present situation, and is, more than ever, in a position to lead in the mechanical advances which will permit the industry to prosper, expand and fulfill its mission in both the entertainment and educational fields.

"Talkies" for the Deaf

Fear that the talkies would deprive them of the entertainment the silent drama has given them in the past, has been dispelled among deaf movie lovers with the announcement of a new device that will enable deaf persons to hear the talkies.

The new device is in the nature of earphones which plug into a special seat socket in the theater. This device was introduced in connection with the decent presentation of Filmaphone Talking Pictures at the Electric Palace, Marble Arch, England.

A special connection was made with the Filmophone device and the seats were wired. Deaf people simply asked for earphones which they plugged in on the seat. Result, all enjoyed the talkies.

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"The Man and the Moment"—First National—Sol Polito.
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Among Next Month's Features——
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Another story from Africa by Clyde De Vinna, A. S. C.

A Royal Elephant Hunt in Siam by Jack Smith, A. S. C.

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Jungle

(*Continued from Page 9*)

tenderly lifted the girl and began massaging her back and throat to restore circulation. After a while her eyelids fluttered open. Her black eyes blinked up into the blue ones looking into hers. For a moment she seemed puzzled, the large black eyes were shaded with fear and doubt. Then they cleared and a twinkle came into them.

"Trel," she said tremulously. "Trel, you have come for me? Oh, dear, I knew you would. . . . . ."

"Yes, Kadee, I am here," replied Trel. "Never will I let you out of my sight again. Never!"

"Oh, dear, again I am so happy. When that gorilla-man took me and stole your money, I thought the end of the world had come. Now you are here with me; dear, you are not hurt?"

"No, Kadee. Do you feel better? Can you get up?"

They arose. The girl stood tottering, hanging on Trel's arms, her eyes avoiding the mangled body of the Bengal tiger.

Then the giant coolie lurched to his feet and with the manner of a whipped dog, approached the white man. From head to foot he was a mass of cuts and bruises, with blood and filth matting his hairy body. At a respectful distance he stopped, put his hands to his forehead and bowed low before the white man supporting the trembling girl.

"Trel, sahib," said the coolie. "Me damn fool. Me catchum girl. Me catchum monee. Me run away. Me get killed by tiger. You save me—you catchum me life now!"

The pidgin speech ended, the coolie let his eyes wander once to the dead tiger, then stepped over and placing his huge bloody hands on Trel's shoulders, gave him a look of gratitude such as few men are privileged to see. The gesture was made in silence and all three fully understood.

Slowly the big Javanese's knees bent, then jerked straight. Pallor swept across his swarthy features. Again his knees sagged. His mouth opened, then he dropped to the ground and lay still at the white man's feet.

Silence settled down upon the jungle tragedy. Trel and the girl stood motionless, looking down at the prone form, then their eyes lifted toward the homeward trail.

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What Are the Wild Waves Saying?

WE HAVEN'T the slightest idea. But here is Barry Norton, handsome young rascal, apparently trying to make believe he is both director and cinematographer. If you have one of those old-fashioned stereoscopes—the kind that used to have a place of honor in the parlor—just cut out this picture, paste it on a cardboard and put it in the "scope." The result will be a pleasant surprise. Better keep the picture as we are going to run one or two each month, and you can soon have a collection unobtainable anywhere else.

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Miller, Virgil E.—F.B.O.
Mohr, Hal—Universal.
McDonnell, Claude—London, Eng.
MacWilliams, Glen—Fox.
Meehan, George—Fox
Morgan, Ira H.—M.G.M.
Milner, Victor—Paramount
Marshall, John R.—Fox.
Marta, Jack A.—Fox.
Nogle, George G.—M.G.M.
O'Connell, L. Wm.—Fox.
Parrish, Fred—Colorado Springs, Colo.
Pahle, Ted—Paramount, New York.
Palmer, Ernest—Fox.
Powers, Len—
Perry, Paul P.—United Artists.
Perry, Harry—Caddo Prod.
Polito, Sol—First National
Pollock, Gordon B.—Lasky.
Pomeroy, Roy—
Parker, Robert M.—
Roos, Len H.—Steffens Studios, Vancouver, B.C.
Rose, Jackson J.—Tiffany.
Rosher, Chas.—Elstree Studios, England.
Ries, Park J.—
Ritchie, Eugene Robt.—Lasky.
Ragin, David—Fox.
Rees, Wm. A.—Warner Bros. Vitaphone.
Schoenbaum, Chas.—Technicolor.
Stengler, Mack—F.B.O.
Stevens, George—Hal Roach.
Struss, Karl —United Artists.
Stumar, John—Universal.
Stumar, Chas.—Berlin, Germany.
Sharp, Henry—United Artists, Doug. Fairbanks.
Schneiderman, Geo.—Fox Movietone.
Scott, Homer A.—
Seitz, John F.—First National.
Snyder, Edward J.—Metropolitan.
Shearer, Douglas G.—M. G.M.
Stull, Wm.—
Smith, Jack—Bangkok, Siam.
Sigurdson, Oliver—Pathe.
Schmitz, John J.—
Smith, Jean C.—
Shackelford, J. B.—Paramount.
Tuers, Wm.—Caddo.
Tolhurst, Louis H.—M.G.M.
Tappenbeck, Hatto—Fox.
Valentine, J. A.—Fox.
Van Trees, James—
Van Enger, Chas. J.—Fox.
Van Buren, Ned—Eastman Kodak Co., Hollywood.
Van Rossem, Walter J.—
Wagner, Sidney C.—Fox.
Walker, Joseph—Fox.
Walker, Vernon L.—Warner Bros.
Wrigley, Dewey—Metropolitan.
Wyckoff, Alvin—United Artists.
Wells, Conrad—Fox.
Wenstrom, Harold—
Whitman, Phil H.—
Wilky, L. Guy—
Warrenton, Gilbert—Universal.
Williams, Frank D.—
Westerberg, Fred—United Artists.
Young, Jack R.—M.G.M.
Zucker, Frank C.—Photophone, Inc., New York.

In Regard to the notice appearing in the PRESS recently announcing a merger of our Corporation with others, we wish to confirm this, and at the same time assure our friends and customers that there will be no change in management or policy from the past, except that we will render better service if that is possible.

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